Bulletin bibliographique

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BULLETIN BIBLIOGRAPHIQUE

Généralités

Herbert AMANN, Joachim ESCHER. — **Analysis III.** — Translated from the German by Silvio Levy and Matthew Cargo. — Un vol. broché, 17×24, de XII, 468 p. — ISBN 978-3-7643-7479-2. — Prix: SFr. 125.00. — Birkhäuser, Basel, 2009.

The third and last volume of this work is devoted to integration theory and the fundamentals of global analysis. Once again, emphasis is laid on a modern and clear organization, leading to a well structured and elegant theory and providing the reader with effective means for further development. Thus, for instance, the Bochner-Lebesgue integral is considered with care, since it constitutes an indispensable tool in the modern theory of partial differential equations. Similarly, there is discussion and a proof of a version of Stokes's theorem that makes ample allowance for the practical needs of mathematicians and theoretical physicists. As in earlier volumes, there are many glimpses of more advanced topics, which serve to give the reader an idea of the importance and power of the theory. Those prospective sections also help drill in and clarify the material presented. Numerous examples, concrete calculations, a variety of exercises and a generous number of illustrations make this textbook a reliable guide and companion for the study of analysis.

Jacques BAIR, Valérie HENRY. — **Analyse infinitésimale: le calculus redécouvert.** — Pédasup, vol. 50. — Un vol. broché, 16×24, de 189 p. — ISBN 978-2-87209-919-1. — Prix: €22.00. — Academia Bruylant, Louvain-la-Neuve, 2008.

L'objet principal de ce livre est l'analyse mathématique, plus précisément l'étude des fonctions (explicites ou implicites) à une variable réelle en l'abordant d'un point de vue soit local, c'est-à-dire au voisinage immédiat d'un point, soit asymptotique, c'est-à-dire pour des points situés fort loin de l'origine dans le plan. Cet ouvrage diffère de cours classiques d'analyse par différents aspects: l'approche retenue est celle de l'analyse non-standard, qui fut créée à la fin du siècle dernier par l'américain Robinson: elle remet à l'honneur, dans un cadre rigoureux, des raisonnements infinitésimaux utilisés de façon intuitive depuis le 17$^{\text{ème}}$ siècle avant d'être progressivement abandonnés par les mathématiciens. — La matière est présentée dans le contexte des nombres hyperréels qui sont d'abord introduits de façon intuitive à partir d'angles. — La théorie est

exposée en recourant systématiquement à deux instruments, à savoir des microscopes et des télescopes virtuels, les premiers permettant de 'grossir' une figure très petite, tandis que les seconds 'rapprochent' des objets très éloignés. — L'étude se fait en deux étapes: tout d'abord sont traitées les courbes algébriques qui ne réclament que des manipulations algébriques élémentaires, puis sont abordées les fonctions qui nécessitent l'usage d'outils plus sophistiqués du calcul différentiel. — Dans chaque chapitre figurent des lectures complémentaires, comprenant soit des modèles mathématiques soit des citations historiques, certains approfondissements plus techniques, ainsi qu'une sélection d'exercices avec des éléments de solutions.

Stéphane BALAC, Laurent CHUPIN. — **Analyse et algèbre: cours de mathématiques de deuxième année avec exercices corrigés et illustrations avec Maple.** — Collection des sciences appliquées de l'INSA de Lyon. — Un vol. broché, 16×24, de XXIV, 1035 p. — ISBN 978-2-88074-782-4. — Prix: SFr. 79.50. — Presses polytechniques et universitaires romandes, Lausanne, 2008.

Cet ouvrage, réunissant en un tout cohérent analyse et algèbre, s'adresse de manière plus spécifique aux élèves de deuxième année des cycles préparatoires intégrés des écoles d'ingénieurs mais il peut être utilisé avec profit par tout étudiant se destinant à des études supérieures d'ingénieur. Il est la suite naturelle de l'ouvrage "Algèbre et analyse, cours de mathématiques de première année" publié dans la même collection par S. Balac et F. Sturm. Il est issu de l'enseignement dispensé par les auteurs dans la filière de premier cycle international ASINSA de l'INSA de Lyon. A ce titre, il ne constitue pas seulement une somme de connaissances mathématiques de deuxième année de l'enseignement supérieur mais vise à présenter de manière précise les résultats essentiels à une formation d'ingénieur généraliste. L'ouvrage est divisé en 13 chapitres regroupés en 4 grandes parties: suites et séries de fonctions, algèbre bilinéaire, calcul différentiel et calcul intégral pour les fonctions de plusieurs variables. Chaque chapitre contient de courts exercices visant à tester la bonne compréhension des notions introduites et se termine par quelques exercices de synthèse. Une correction détaillée et commentée de tous les exercices est fournie en fin de chapitre. Le logiciel de calcul formel Maple est largement utilisé dans tout l'ouvrage pour illustrer les notions introduites.

Yves BIOLLAY, Amel CHAABOUNI, Joachim STUBBE. — **Bien commencer ses études scientifiques: savoir-faire en maths.** — Un vol. broché, 15,5×21, de XIII, 204 p. — ISBN 978-2-88074-779-4. — Prix: SFr. 27.00. — Presses polytechniques et universitaires romandes, Lausanne, 2008.

Ce manuel a été conçu pour aider les étudiants à bien réussir leur première année d'études scientifiques. Il leur sera utile pour se préparer avant de commencer les études, et leur servira de support de cours durant les deux premiers semestres. Pédagogique et didactique, il présente des concepts de base des mathématiques, sous la forme de problèmes à résoudre et de rappels de notions théoriques s'y rapportant. Les étudiants pourront l'utiliser en commençant par le chapitre de leur choix; il leur permettra d'évaluer leur capacité à résoudre un problème et à contrôler la justesse de leurs raisonnements.

J. M. BORWEIN, E. M. ROCHA, J. F. RODRIGUES, (Editors). — **Communicating mathematics in the digital era.** — Un vol. relié, 16×23,5, de XII, 325 p. — ISBN 978-1-56881-410-0. — Prix: US$49.00. — A. K. Peters, Wellesley, Massachussetts, 2008.

Digital technology has dramatically changed the ways in which scientific work is published, disseminated, archived, and accessed. The processes and formats are still rapidly evolving due to improvements in information science, new achievements in computer science technologies, and initiatives such as DML and open access journals, digitization projects, scientific reference catalogs,

and digital repositories. Many mathematicians are taking an active part in the development of projects related to these new opportunities and are discussing new ideas with colleagues from other fields, such as technology developers and publishers. This book is a collection of thought-provoking essays and reports on a number of such projects discussing the paradigms and offering mechanisms for producing, searching, and exploiting scientific and technical scholarship in mathematics in the digital era.

Claudio CANUTO, Anita TABACCO. — **Mathematical analysis, vol. 1.** — Universitext. — Un vol. broché, 15,5×23,5, de XII, 433 p. — ISBN 978-88-470-0875-5. — Prix: €38.95. — Springer, Milan, 2008.

The purpose of the volume is to provide a support for a first course in mathematical analysis, along the lines of the recent programme specifications for mathematical teaching in European universities. The contents are organised to appeal especially to engineering, physics and computer science students, all areas in which mathematical tools play a crucial role. Basic notions and methods of differential and integral calculus for functions of one real variable are presented in a manner that elicits critical reading and prompts a hands-on approach to concrete applications. The layout has a specifically-designed modular nature, allowing the instructor to make flexible didactical choices when planning an introductory lecture course. The book may in fact be employed at three levels of depth. At the elementary level the student is supposed to grasp the very essential ideas and familiarise with the corresponding key techniques. Proofs to the main results befit the intermediate level, together with several remarks and complementary notes enhancing the treatise. The last, and farthest-reaching, level consists of links to online material, which enable the strongly motivated reader to explore further into the subject. Definitions and properties are furnished with substantial examples to stimulate the learning process. Over 350 solved exercises complete the text, at least half of which guide the reader to the solution. Written for: engineering, physics and computer science students.

Marc CHAPERON. — **Calcul différentiel et calcul intégral, 3^{e} année : cours et exercices avec solutions.** — 2^{e} édition. — Collection Sciences sup. Licence 3, Master. — Un vol. broché, 17×24, de IX, 438 p. — ISBN 978-2-10-051486-1. — Prix: €34.00. — Dunod, Paris, 2008.

Prolongement du cours de 1re et 2^{e} années de François Liret et Dominique Martinais, ce cours de mathématiques traite en quatre volumes le programme de la troisième année de Licence. Cette seconde édition du quatrième volume, entièrement révisée, se termine par un nouveau chapitre sur les probabilités. Les principaux thèmes de l'ouvrage sont la théorie de la mesure et l'intégration, le calcul différentiel et les équations différentielles. Parmi les sujets abordés, certains sont très classiques, d'autres moins : fonctions analytiques en dimension quelconque, méthode du chemin, équations aux dérivées partielles du premier ordre, systèmes dynamiques. Tous sont du niveau de la troisième ou quatrième année d'université. De nombreux exercices avec solutions viennent illustrer le cours et en faciliter l'assimilation, afin de fournir à l'étudiant de Licence et de Master ainsi qu'au candidat à l'agrégation un outil indispensable à la réussite de ses études.

Bertrand CINTRACT, Jean-Jacques COLIN. — **Ensembles, relations, applications, dénombrement : L1, L2, L3, classes préparatoires.** — Avec la participation de Rémi MORVAN. — Bien débuter en mathématiques. — Un vol. broché, 14,5×20,5, de 154 p. — ISBN 978-2-85428-881-0. — Prix: €17.00. — Cépaduès-Éditions, Toulouse, 2009.

Cet ouvrage s'adresse essentiellement aux étudiants de L1 à l'Université, et aux étudiants de première année des classes préparatoires aux Grandes Écoles. Les questions abordées sont en général celles qui sont enseignées en début d'année : rudiments de logique, ensembles, applications, relations d'équivalence et d'ordre. Ce fascicule se termine par un chapitre sur l'ensemble des

nombres entiers naturels, et un chapitre sur les problèmes de dénombrement. L'étude de ces thèmes sera également très utile aux étudiants qui préparent le C.A.P.E.S. de mathématiques. Chaque chapitre contient un rappel de cours conséquent et de nombreux exercices corrigés et commentés, la plupart d'entre eux revenant immanquablement dans les sujets d'examen et de concours.

Jean-Jacques COLIN, Jean-Marie MORVAN. — **Formules de Taylor, développements limités : exercices corrigés avec rappels de cours : L1, L2, L3, classes préparatoires.** — Avec la participation de Rémi MORVAN. — Bien débuter en mathématiques. — Un vol. broché, 14,5 × 20,5, de IV, 148 p. — ISBN 978-2-85428-862-9. — Prix : €17.00. — Cépaduès-Éditions, Toulouse, 2008.

Cet ouvrage est consacré à l'étude des formules de Taylor et des développements limités des fonctions d'une variable réelle. Il s'adresse essentiellement aux étudiants de premières années d'Université, (L1, L2, L3), des classes préparatoires aux Grandes Écoles, ainsi qu'aux étudiants qui préparent le C.A.P.E.S. de mathématiques. Il propose à la fois des rappels de cours et des exercices corrigés de façon particulièrement détaillée, classés par ordre de difficulté croissante. Le lecteur pourra ainsi progresser à son rythme et de façon autonome dans cette discipline. Les rappels de cours et les exercices sont agrémentés de pages historiques, qui replacent les résultats énoncés dans leur contexte. Les exercices proposés sont typiques des questions posées aux examens et aux concours. Une fois ces notions assimilées, le lecteur pourra sans difficultés s'engager dans des études plus avancées.

Eric DECREUX. — **Mathématiques, sciences et musique : une introduction historique.** — Un vol. broché, 16,5 × 24, de 301 p. — ISBN 978-2-7298-4096-9. — Prix : €24.50. — Ellipses, Paris, 2008.

Musique et sciences, et singulièrement musique et mathématiques, semblent actuellement présenter des affinités importantes. Les outils qu'un modèle scientifique du son met à la disposition des musiciens grâce aux possibilités qu'offre l'informatique contribuent probablement à ce point de vue. Il serait toutefois réducteur d'attribuer la richesse des débats sur ce sujet à ces seuls progrès techniques. De l'Antiquité gréco-latine au Moyen Age occidental et arabe, Pythagore, ses épigones et ses contradicteurs, ont discuté des relations entre les pratiques musicales de leurs époques, les mathématiques et leur conception du monde physique. De la Renaissance au début du XX^{e} siècle, les débats qui ont accompagné la remise en cause progressive des modèles du passé ont contribué à construire une approche moderne du phénomène sonore, mais aussi à préciser la place que la science – qui décrit et explique un élément du monde physique aussi objectivement que possible – peut tenir dans ses interactions avec un domaine artistique – qui crée à partir de cet élément. Ainsi, J. Sauveur, que l'on considère comme le fondateur de l'acoustique, déclare-t-il au siècle des Lumières au sujet de la musique : "son objet est le son, en tant qu'il est agréable à l'oreille". Le propos de ce livre est d'esquisser une perspective historique de la lente élaboration d'un modèle physico-mathématique du son, le plus souvent en réponse à des questions musicales. Il permet d'apprécier la pertinence de ce modèle, mais aussi les conditions de sa création et ses limites. Il constitue en cela une introduction utile au lecteur désireux d'approfondir sa réflexion dans le domaine abordé.

Nicolas GAUVRIT. — **Vous avez dit hasard ? Entre mathématiques et psychologie.** — Bibliothèque scientifique. — Un vol. broché, 18,5 × 24,5, de 239 p. — ISBN 978-2-7011-4622-5. — Prix : €25.00. — Belin - Pour la science, Paris, 2009.

Qu'est-ce que le hasard et existe-t-il vraiment ? Par quels mécanismes près d'un tiers des personnes interrogées répondent-elles 7 à la question "donnez un chiffre au hasard ?". Pourquoi n'y a-t-il rien d'improbable à partager un ami commun avec son voisin de siège en avion ?

Découvrez la réponse à ces questions et bien d'autres dans ce livre ludique et passionnant, à la croisée de deux disciplines : les mathématiques et la psychologie. Recourir aux mathématiques et à l'informatique paraît naturel pour définir formellement le hasard et en dégager les principales caractéristiques. Moins attendue pourtant est l'illusion qui nous affecte souvent face à l'imprévu et aux coïncidences : comme les psychologues l'ont montré, l'irrationalité de nos décisions, de nos superstitions, voire de nos croyances, tient en partie à une perception aussi fluctuante qu'imprécise du hasard ! C'est ce qu'illustre l'auteur à travers de nombreux exemples issus de notre quotidien, de l'horoscope au loto en passant par le biais d'alternance ou l'apparition de la vie sur Terre… Un dialogue inattendu entre deux domaines-phares du savoir, une invitation à la découverte fascinante du hasard.

Mariano GIAQUINTA, Giuseppe MODICA. — **Mathematical analysis : an introduction to functions of several variables.** — Un vol. relié, 16,5 × 24, de XII, 348 p. — ISBN 978-0-8176-4509-0. — Prix : €119.00. — Birkhäuser, Boston, 2009.

This text introduces basic ideas, structures, and results of differential and integral calculus for functions of several variables. The presentation is engaging and motivates the reader with numerous examples, remarks, illustrations, and exercises. *Mathematical Analysis : An Introduction to Functions of Several Variables* may be used in a classroom setting for advanced undergraduate and graduate students, or as a self-study guide. It is also a valuable reference for researchers in most mathematical disciplines. An appendix highlights mathematicians and scientists who have made important contributions to the development of theories in the subject. Other books recently published by the authors – all of which provide the reader with a strong foundation in modern-day analysis – include : *Mathematical Analysis : Functions of One Variable*, *Mathematical Analysis : Approximation and Discrete Processes*, *Mathematical Analysis : Linear and Metric Structures and Continuity.*

Daniel GUIN, Thomas HAUSBERGER. — **Algèbre, tome 1 : Groupes, corps et théorie de Galois.** — Collection Enseignement sup. Mathématiques. — Un vol. broché, 17 × 24, de XX, 457 p. — ISBN 978-2-86883-974-9. — Prix : €37.00. — EDP Sciences, Les Ulis, 2008.

Ce livre s'adresse aux étudiants de licence ou master de mathématiques (L3–M1) et à ceux qui préparent le Capes ou l'agrégation. Il traite de la théorie des groupes, de la théorie des corps et d'un de leurs points communs essentiels, la théorie de Galois des extensions finies. Chacune de ces théories est présentée en détails, depuis les définitions de base jusqu'à des résultats très élaborés. On y présente de nombreuses applications comme, par exemple, les problèmes de constructions à la règle et au compas (quadrature du cercle, trisection de l'angle, duplication du cube, polygones réguliers), ainsi que la résolution par radicaux des équations polynomiales. Les chapitres sont, pour la plupart, suivis de thèmes de réflexion (TR) et de travaux pratiques de "mathématiques assistées par ordinateurs" (TP). Ces TR et TP permettent d'étudier en profondeur des notions qui illustrent ou complètent le cours.

Magdolna HARGITTAI, István HARGITTAI. — **Candid science IV : conversations with famous physicists.** — Un vol. broché, 16,5 × 25, de XVI, 711 p. — ISBN 1-86094-416-7. — Prix : £49.00. — Imperial College Press, London, distributed by World Scientific Publishing, Singapore, 2004.

Candid Science IV : Conversations with Famous Physicists contains 36 interviews with well-known physicists, including 20 Nobel laureates, Templeton Prize winners, Wolf Prize winners, and other luminaries. Physics has been one of the determining fields of science in the past 100 years, playing a conspicuous role not only in science but also in world politics and economics. These in-depth conversations provide a glimpse into the greatest achievements of physics during

the past few decades, featuring stories of the discoveries, and showing the human drama behind them. The greatest physicists are brought into close human proximity as if readers were having a conversation with them. The interviewees span a wide range of scientists, from such early giants as Eugene Wigner and Mark Oliphant to members of the youngest generation such as the 2001 Nobel laureate Wolfgang Ketterle. The list includes famous personalities of our time, such as Steven Weinberg, Leon Lederman, Norman Ramsey, Edward Teller, John Wheeler, Mildred Dresselhaus, Maurice Goldhaber, Benoit Mandelbrot, John Polkinghorne, and Freeman Dyson.

Balazs HARGITTAI, István HARGITTAI. — **Candid science V : conversations with famous scientists.** — Un vol. broché, 16,5×25, de XVI, 695 p. — ISBN 1-86094-506-6. — Prix : £39.00. — Imperial College Press, London, distributed by World Scientific Publishing, Singapore, 2005.

Candid Science V : Conversations with Famous Scientists contains 36 interviews with well-known scientists, including 19 Nobel laureates, Wolf Prize winners, and other luminaries. These in-depth conversations provide a glimpse into the greatest achievements in science during the past few decades, featuring stories of the discoveries, and showing the human drama behind them. The greatest scientists are brought into close human proximity as if readers were having a conversation with them. This volume departs from the previous ones in that it contains interviews with mathematicians in addition to physicists, chemists, and biomedical scientists. Another peculiarity of this volume is that it includes nine interviews from another project, the collection of the late Clarence Larson, former Commissioner of the Atomic Energy Commission and his wife, Jane ("Larson Tapes"). The 36 interviewees include famous personalities of our time, such as Donald Coxeter, John Conway, Roger Penrose, Alan Mackay, Dan Shechtman, Charles Townes, Arthur Schawlow, Leon Cooper, Alexei Abrikosov, Luis Alvarez, William Pickering, William Fowler, Vera Rubin, Neta Bahcall, Rudolf Peierls, Emilio Segre, Harold Agnew, Clarence Larson, Nelson Leonard, Princess Chulabhorn, Linus Pauling, Miklós Bodánszky, Melvin Calvin, Donald Huffman, Alan MacDiarmid, Alan Heeger, Jens Christian Skou, Paul Lauterbur, Gunther Stent, John Sulston, Renato Dulbecco, Baruch Blumberg, Arvid Carlsson, Oleh Hornykiewicz, Paul Greengard, and Eric Kandel.

Kevin HOUSTON. — **How to think like a mathematician : a companion to undergraduate mathematics.** — Un vol. broché, 19×25, de XI, 265 p. — ISBN 978-0-521-71978-0 (relié : 978-0-521-89546-0). — Prix : £18.99 (relié : £45.00). — Cambridge University Press, Cambridge, 2009.

Looking for a head start in your undergraduate degree in mathematics ? Maybe you've already started your degree and feel bewildered by the subject you previously loved ? Don't panic ! This friendly companion will ease your transition to real mathematical thinking. Working through the book, you will develop an arsenal of techniques to unlock the meaning of definitions, theorems and proofs, solve problems, and write mathematics effectively. All the major methods of proof – direct method, cases, induction, contradiction and contrapositive – are featured. Concrete examples are used throughout, and you'll get plenty of practice on topics common to many courses such as divisors, Euclidean algorithm, modular arithmetic, equivalence relations, and injectivity and surjectivity of functions. The material has been tested by real students over many years, so all the essentials are covered. With over 300 exercises to help you test your progress, you'll soon learn how to think like a mathematician. Essential for any starting undergraduate in mathematics, this book can also help if you're studying engineering or physics and need access to undergraduate mathematics topics, or if you're taking a subject that requires logic such as computer science, philosophy or linguistics.

Wieslawa J. KACZOR, Maria T. NOWAK. — **Problèmes d'analyse I : nombres réels, suites et séries.** — Traduction : Eric KOURIS. — Collection Enseignement sup. Mathématiques. — Un vol. broché, 17 × 24, de X, 368 p. — ISBN 978-2-7598-0058-2. — Prix : €30.00. — EDP Sciences, Les Ulis, 2008.

On apprend les mathématiques en résolvant des problèmes. Ce livre est le premier volume d'une série de trois recueils d'exercices et d'analyse. Il s'adresse principalement aux étudiants des niveaux L1 et L2 des universités et aux élèves des classes préparatoires aux grandes écoles. Il sera aussi d'une grande utilité pour les candidats aux concours du CAPES et de l'agrégation de mathématiques. Il contient plus de 600 problèmes pour aider à améliorer et approfondir la compréhension des suites et des séries numériques. On trouvera ainsi de nombreux exemples d'étude de suites et de séries, un traitement approfondi des critères de convergence ou encore une étude des produits infinis. Son organisation, le niveau et le choix des exercices en font un outil parfaitement adapté pour travailler par soi-même. Chaque section commence par des exercices relativement simples et se poursuit par des problèmes plus difficiles. Tous les exercices sont corrigés.

Wieslawa J. KACZOR, Maria T. NOWAK. — **Problèmes d'analyse II : continuité et dérivabilité.** — Traduction : Eric KOURIS. — Collection Enseignement sup. Mathématiques. — Un vol. broché, 17 × 24, de XII, 373 p. — ISBN 978-2-7598-0086-5. — Prix : €30.00. — EDP Sciences, Les Ulis, 2008.

On apprend en faisant, on apprend les mathématiques en résolvant des problèmes et on apprend plus de mathématiques en résolvant plus de problèmes. Cet ouvrage suit le volume I des Exercices corrigés d'Analyse. Il s'adresse principalement aux étudiants des niveaux L1 à L3 des universités et aux élèves des classes préparatoires aux grandes écoles. Il sera aussi d'une grande utilité pour les candidats aux concours du CAPES et de l'agrégation de mathématiques. Il contient près de 600 problèmes pour aider à améliorer et approfondir la compréhension des fonctions continues, des fonctions dérivables et des séries de fonctions. Ceux-ci sont regroupés suivant les thèmes et les propriétés étudiés. On trouvera ainsi un large choix d'exercices sur les propriétés des fonctions continues, le théorème des accroissements finis, les formules de Taylor, l'utilisation des dérivées, les séries entières, ... Chaque section commence par des exercices relativement simples et se poursuit par des problèmes plus difficiles. Tous les exercices sont corrigés.

Wieslawa J. KACZOR, Maria T. NOWAK. — **Problèmes d'analyse III : intégration.** — Traduction : Eric KOURIS. — Collection Enseignement sup. Mathématiques. — Un vol. broché, 17 × 24, de XIV, 361 p. — ISBN 978-2-7598-0087-2. — Prix : €30.00. — EDP Sciences, Les Ulis, 2008.

La meilleure façon d'apprendre la théorie de l'intégration et d'en voir les subtilités est de résoudre des exercices et des problèmes. Ce livre traite de l'intégration des fonctions réelles d'une variable réelle. Il s'adresse principalement aux étudiants des niveaux L3 et M1 des universités, mais les étudiants des niveaux L1, L2 et les élèves des classes préparatoires aux grandes écoles trouveront dans le premier chapitre de nombreux exercices pour approfondir leur cours sur l'intégration. Ce livre sera aussi d'une grande utilité pour les candidats aux concours du CAPES et de l'agrégation de mathématiques. Il contient plus de 500 problèmes portant sur les intégrales de Riemann et Riemann-Stieltjes et sur l'intégrale de Lebesgue. On y trouvera, en plus des exercices de calcul classiques, une section sur les inégalités liées à l'intégrale de Riemann, une autre sur la mesure de Jordan ou encore de nombreux problèmes sur les théorèmes de convergence et les théorèmes de permutation d'intégrales et de limites, de sommes ou de dérivées dans la théorie de Lebesgue. L'ouvrage se conclut par une large section sur les séries de Fourier. Tous les exercices sont corrigés.

Falko LORENZ. — **Algebra, vol. 2 : Fields with structure, algebras and advanced topics.** — With the collaboration of the translator, Silvio LEVY. — Universitext. — Un vol. broché, 15,5 × 23,5, de IX, 336 p. — ISBN 978-0-387-72487-4. — Prix : €39.95. — Springer, New York, 2008.

The present textbook is a lively, problem-oriented and carefully written introduction to classical modern algebra. The author leads the reader through interesting subject matter, while assuming only the background provided by a first course in linear algebra. The first volume focuses on field extensions. Galois theory and its applications are treated more thoroughly than in most texts. It also covers basic applications to number theory, ring extensions and algebraic geometry. The main focus of the second volume is on additional structure of fields and related topics. Much material not usually covered in textbooks appears here, including real fields and quadratic forms, the Tsen rank of a field, the calculus of Witt vectors, the Schur group of a field, and local class field theory. Both volumes contain numerous exercises and can be used as a textbook for advanced undergraduate students.

Paolo MANCOSU, (Editor). — **The philosophy of mathematical practice.** — Un vol. relié, 16 × 24, de XI, 447 p. — ISBN 978-0-19-929645-3. — Prix : £53.00. — Oxford University Press, Oxford, 2008.

Contemporary philosophy of mathematics offers us an embarrassment of riches. Among the major areas of work one could list developments of the classical foundational programs, analytic approaches to epistemology and ontology of mathematics, and developments at the intersection of history and philosophy of mathematics. But anyone familiar with contemporary philosophy of mathematics will be aware of the need for new approaches that pay closer attention to mathematical practice. This book is the first attempt to give a coherent and unified presentation of this new wave of work in philosophy of mathematics. The new approach is innovative at least in two ways. First, it holds that there are important novel characteristics of contemporary mathematics that are just as worthy of philosophical attention as the distinction between constructive and non-constructive mathematics at the time of the foundational debates. Secondly, it holds that many topics which escape purely formal logical treatment – such as visualization, explanation, and understanding – can nonetheless be subjected to philosophical analysis. *The Philosophy of Mathematical Practice* comprises an introduction by the editor and eight sections written by some of the leading scholars in the field. Each section consists of a short introduction outlining the general topic followed by a related research article. The eight topics selected represent a broad spectrum of contemporary philosophical reflection on different aspects of mathematical practice : visualization ; diagrammatic reasoning and representational systems ; mathematical explanation ; purity of methods ; mathematical concepts ; the philosophical relevance of category theory ; philosophical aspects of computer science in mathematics ; the philosophical impact of recent developments in mathematical physics.

Gilbert MONNA. — **Problèmes corrigés et commentés de mathématiques, T. 3 : algèbre linéaire et euclidienne : L2, L3, classes préparatoires.** — Avec la participation de Rémi MORVAN. — Bien débuter en mathématiques. — Un vol. broché, 14,5 × 20,5, de 151 p. — ISBN 978-2-85428-882-7. — Prix : €17.00. — Cépaduès-Éditions, Toulouse, 2009.

Cet ouvrage est un recueil de problèmes d'algèbre linéaire et euclidienne qui s'adresse aux étudiants de deuxième et troisième année d'Université, des classes préparatoires aux Grandes Ecoles, ainsi qu'aux étudiants qui préparent le C.A.P.E.S. de mathématiques. L'auteur y aborde la réduction des endomorphismes, l'étude des formes multilinéaires, et celle des espaces euclidiens. Chaque problème est soigneusement corrigé, commenté, et se trouve précédé de rappels de cours indispensables à sa résolution. Certains problèmes sont relativement simples, d'autres sont plus

délicats, et offrent au lecteur la possibilité de faire une synthèse des connaissances qu'il a acquises au cours de ses études. Il pourra ainsi tester son niveau et constater ses progrès. Le texte est agrémenté de pages historiques, qui replacent les résultats énoncés dans leur contexte.

Marian MUREŞAN. — **A concrete approach to classical analysis.** — CMS books in mathematics. — Un vol. relié, 16,5×24,5, de XVIII, 433 p. — ISBN 978-0-387-78932-3. — Prix : €46.95. — Springer, New York, 2009.

Mathematical analysis offers a solid basis for many achievements in applied mathematics and discrete mathematics. This new textbook is focused on differential and integral calculus, and includes a wealth of useful and relevant examples, exercises, and results enlightening the reader to the power of mathematical tools. The intended audience consists of advanced undergraduates studying mathematics or computer science. The author provides excursions from the standard topics to modern and exciting topics, to illustrate the fact that even first or second year students can understand certain research problems. The text has been divided into ten chapters and covers topics on sets and numbers, linear spaces and metric spaces, sequences and series of numbers and of functions, limits and continuity, differential and integral calculus of functions of one or several variables, constants (mainly π) and algorithms for finding them, the W–Z method of summation, estimates of algorithms and of certain combinatorial problems. Many challenging exercises accompany the text. Most of them have been used to prepare for different mathematical competitions during the past few years. In this respect, the author has maintained a healthy balance of theory and exercises.

Hirokazu NISHIMURA and Susumu KURODA, (Editors). — **A lost mathematician, Takeo Nakasawa : the forgotten father of matroid theory.** — Un vol. relié, 17×24, de XII, 234 p. — ISBN 978-3-7643-8572-9. — Prix : SFr. 89.90. — Birkhäuser, Basel, 2009.

Matroid theory was invented in the middle of the 1930s by two mathematicians independently, namely, Hassler Whitney in the USA and Takeo Nakasawa in Japan. Whitney became famous, but Nakasawa remained anonymous until two decades ago. He left only four papers to the mathematical community, all of them written in the middle of the 1930s. It was a bad time to have lived in a country that had become as eccentric as possible. Just as Nazism became more and more flamboyant in Europe in the 1930s, Japan became more and more esoteric and fanatical in the same time period. This book explains the little that is known about Nakasawa's personal life in a Japan that had, among other failures, lost control over its military. We do not know what forces caused him to be discharged from the Tokyo University of Arts and Sciences. His work was considered brilliant, his papers superb, if somewhat unconventional and mysterious in notation. We do know that, in the latter half of the 1930s, forced to give up his mathematical career, he chose to live as a bureaucrat in Manchuria, at that time a puppet state of Japan. He died in 1946 at Khavarovsk, at the age of 33, after one year of forced labor in Siberian and other USSR camps, without sufficient food or shelter to protect his health. This book contains his four papers in German and their English translations as well as some extended commentary on the history of Japan during those years. The book also contains 14 photos of him or his family. Although the veil of mystery surrounding Nakasawa's life has only been partially lifted, the work presented in this book speaks eloquently of a tragic loss to the mathematical community.

Jean-Claude PONT, (Editor). — **Collected works of Charles François Sturm.** — In collaboration with Flavia PADOVANI. — Un vol. relié, 17,5×24, de X, 808 p. — ISBN 978-3-7643-7989-6. — Prix : SFr. 259.00. — Birkhäuser, Basel, 2009.

Charles François Sturm was born in Geneva, Switzerland, on September 29, 1803. He obtained his scientific education in this city and Geneva honoured his memory on the occasion

of the 200th anniversary of his birth by a colloquium and workshop in Geneva held in 2003. This volume is based on lectures presented at that colloquium. The focus is on C. F. Sturm's own work. The book contains particular reproductions of his scientific publications. Sturm contributed notably to geometry (theory of polygons, elementary geometry, projective geometry, conic sections...), algebra, analysis (differential equations, series...), optics (caustics, physiological optics), mechanics, other work in physics (particularly fluid mechanics and speed of sound in water). These original papers are accompanied by contributions from internationally renowned experts thereby deepening topics like differential equations, optics and algebraic curves. The volume complements the book on the development of Sturm-Liouville theory (ISBN 978-3-7643-7066-4) that also originates from that colloquium.

Benoît RITTAUD. — **Les nombres extraordinaires.** — Le collège de la cité, vol. 40. — Un vol. broché, 10×16, de 186 p. — ISBN 978-2-7465-0401-1. — Prix: €8.60. — Le Pommier, Paris, 2009.

Certains nombres ont acquis un prestige particulier, en raison de leurs propriétés mathématiques, de leurs multiples applications et aussi de la "part de rêve" qu'ils nous donnent au travers de ce qui constitue parfois une véritable mythologie. Le nombre π et ses décimales mystérieuses calculées avec toujours plus de précision, le nombre d'or dont la richesse mathématique n'a d'égale que la profusion de mythes qu'il a engendrés, la racine carrée de 2 que nous contemplons tous les jours sans le savoir lorsque nous utilisons une feuille de papier au format A4, le zéro, l'unité, mais aussi le nombre i, "base des imaginaires purs", ou encore le nombre e, "base des logarithmes népériens", sont autant de représentants parmi les plus éminents du panthéon des nombres. En livrer quelques unes des innombrables clés est l'objet de cet ouvrage. Bien sûr, cette liste ne se limite pas à ces nombres; beaucoup d'autres nombres "extraordinaires", dont nous donnons un bref aperçu en fin d'ouvrage, méritent eux aussi l'attention. Et puis, existe-t-il un nombre qui ne soit pas extraordinaire ?

François ROTHEN. — **Surprenante gravité.** — Focus science. — Un vol. broché, 15×22,5, de X, 356 p. — ISBN 978-2-88074-774-9. — Prix: SFr. 55.00. — Presses polytechniques et universitaires romandes, Lausanne, 2008.

Durant des millénaires, la pesanteur a si naturellement fait partie de notre vie quotidienne que nul ne s'est soucié d'en faire un sujet de réflexion. Les choses changent au 17e siècle lorsque le concept de gravitation universelle apparaît, ouvrant ainsi la porte à de multiples découvertes. C'est au récit de cette épopée scientifique que l'auteur de *Et pourtant elle tourne !* convie le lecteur, de ses origines préhistoriques jusqu'à la réinterprétation actuelle de la loi de la gravitation. Avec le souci permanent d'être compris de tous, spécialistes du sujet comme béotiens en la matière, François Rothen fait le récit des expéditions internationales mises sur pied pour une détermination plus précise de la distance Terre-Soleil; il nous explique comment peser la Terre dans une cave et nous raconte comment les astronomes ont mesuré la vitesse de la lumière à leur insu et découvert l'atmosphère de Vénus sans l'avoir cherchée. Un récit passionnant, entre passé et avenir et entre ciel et terre !

Daina TAIMIŅA. — **Crocheting adventures with hyperbolic planes.** — Un vol. relié, 26×21, de XI, 148 p. — ISBN 978-1-56881-452-0. — Prix: US$35.00. — A. K. Peters, Wellesley, Massachussetts, 2009.

With more than 200 full color photographs, this non-traditional, tactile introduction to non-Euclidean geometries also covers early development of geometry and connections between geometry, art, nature, and sciences. For the crafter or would-be crafter, there are detailed instructions for how to crochet various geometric models and how to use them in explorations.

The models in this book are a prime example of art influencing mathematics and vice versa. In the foreword William Thurston writes, "These models have a fascination far beyond their visual appearance. As illustrated in the book, there is actually negative curvature and hyperbolic geometry all around us, but people generally see it without seeing it. You will develop an entirely new understanding by actually following the simple instructions and crocheting ! The models are deceptively interesting. Perhaps you will come up with your own variations and ideas. In any case, I hope this book gives you pause for thought and changes your way of thinking about mathematics." A sphere has constant positive curvature ; a banana has positive and negative curvature. A surface with constant negative curvature – called the hyperbolic plane – as a mathematical object has traditionally been difficult to visualize, but thanks to Daina Taimiņa, it comes to life with hook and yarn. Taimiņa explores the history of geometry as it pertains to art and other universal features of societies, providing a context in which to comprehend the significance of these beautiful hyperbolic plane models.

Logique et fondements

Su GAO. — **Invariant descriptive set theory.** — Pure and applied mathematics, vol. 293. — Un vol. relié, 16,5×24, de XIV, 383 p. — ISBN 978-1-58488-793-5. — Prix : US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2009.

Exploring an active area of mathematics that studies the complexity of equivalence relations and classification problems, *Invariant Descriptive Set Theory* presents an introduction to the basic concepts, methods and results of this theory. It brings together techniques from various areas of mathematics, such as algebra, topology, and logic, which have diverse applications to other fields. After reviewing classical and effective descriptive set theory, the text studies Polish groups and their actions. It then covers Borel reducibility results on Borel, orbit, and general definable equivalence relations. The author also provides proofs for numerous fundamental results, such as the Glimm-Effros dichotomy, the Burgess trichotomy theorem, and the Hjorth turbulence theorem. The next part describes connections with the countable model theory of infinitary logic, along with Scott analysis and the isomorphism relation on natural classes of countable models such as graphs, trees, and groups. The book concludes with applications to classification problems and many benchmark equivalence relations. By illustrating the relevance of invariant descriptive set theory to other fields of mathematics, this self-contained book encourages readers to further explore this very active area of research.

Alexander S. KECHRIS, Benedikt LÖWE, John R. STEEL, (Editors). — **Games, scales, and Suslin cardinals : the Cabal Seminar, vol. 1.** — Lecture notes in logic, vol. 31. — Un vol. relié, 16×23,5, de XI, 445 p. — ISBN 978-0-521-89951-2. — Prix : £45.00. — Association for Symbolic Logic, Chicago, Illinois, Cambridge University Press, Cambridge, 2008.

The proceedings of the Los Angeles Caltech-UCLA "Cabal Seminar" were originally published in the 1970s and 1980s. *Games, Scales, and Suslin Cardinals* is the first of a series of four books collecting the seminal papers from the original volumes together with extensive unpublished material, new papers on related topics, and discussion of research developments since the publication of the original volumes. Focusing on the subjects of "Games and scales" (Part I) and "Suslin cardinals, partition properties, homogeneity" (Part II), each of the two sections is preceded by an introductory survey putting the papers into present context. This volume will be an invaluable reference for anyone interested in higher set theory.

Analyse combinatoire

Goulnara ARZHANTSEVA, Alain VALETTE, (Editors). — **Limits of graphs in group theory and computer science.** — Fundamental sciences. Mathematics. — Un vol. relié, 17×25, de XV, 285 p. — ISBN 978-2-940222-33-9 (CRC Press: 978-1-4398-0400-1). — Prix: SFr. 98.50. — EPFL Press, Lausanne, distributed by CRC Press, 2009.

This volume grew out from a one-semester research program at the Bernoulli Center (EPFL, Lausanne, Switzerland) from January to June 2007. The research articles and survey papers presented here highlight modern state of the art, current methods and open problems, and are of interest both to experts and graduate students in the fields of geometric combinatorics, theoretical computer science and geometric group theory (plus interactions between them). Indeed, the main research topics herein include the geometric, combinatorial and computational aspects of group theory. In particular, there is a focus on the study of large families of finite graphs with certain "expanding" properties and their embeddings into Hilbert and Banach spaces. Specifically, the authors investigate the structure of finitely generated groups giving rise to such graphs; in addition, new interactions with broad areas of theoretical computer science are considered. The research articles and survey papers presented here are of interest both to experts and graduate students in the fields of geometric combinatorics, theoretical computer science and geometric group theory.

Philippe FLAJOLET, Robert SEDGEWICK. — **Analytic combinatorics.** — Un vol. relié, 18,5×25,5, de XIII, 810 p. — ISBN 978-0-521-89806-5. — Prix: £45.00. — Cambridge University Press, Cambridge, 2009.

Analytic Combinatorics aims to enable precise quantitative predictions of the properties of large combinatorial structures. The theory has emerged over recent decades as essential both for the analysis of algorithms and for the study of scientific models in many disciplines, including probability theory, statistical physics, computational biology and information theory. With a careful combination of symbolic enumeration methods and complex analysis, drawing heavily on generating functions, results of sweeping generality emerge that can be applied in particular to fundamental structures such as permutations, sequences, strings, walks, paths, trees, graphs and maps. This account is the definitive treatment of the topic. In order to make it self-contained, the authors provide full coverage of the underlying mathematics and give a thorough treatment of both classical and modern applications of the theory. The text is complemented with exercises, examples, appendices and notes throughout the book to aid understanding. The book can be used as a reference for researchers, as a textbook for an advanced undergraduate or a graduate course on the subject, or for self-study.

John M. HARRIS, Jeffry L. HIRST, Michael J. MOSSINGHOFF. — **Combinatorics and graph theory.** — Second edition. — Undergraduate texts in mathematics. — Un vol. relié, 16×24,5, de XV, 381 p. — ISBN 978-0-387-79710-6. — Prix: €34.95. — Springer, New York, 2008.

This book covers a wide variety of topics in combinatorics and graph theory. It includes results and problems that cross subdisciplines, emphasizing relationships between different areas of mathematics. In addition, recent results appear in the text, illustrating the fact that mathematics is a living discipline. The second edition includes many new topics and features: New sections in graph theory on distance, Eulerian trails, and Hamiltonian paths. — New material on partitions, multinomial coefficients, and the pigeonhole principle. — Expanded coverage of Pólya theory to include de Bruijn's method for counting arrangements when a second symmetry group acts on the set of allowed colors. — Topics in combinatorial geometry, including Erdős and Szekeres' development of Ramsey theory in a problem about convex polygons determined by sets of points.

— Expanded coverage of stable marriage problems, and new sections on marriage problems for infinite sets, both countable and uncountable. — Numerous new exercises throughout the book.

Wilfried IMRICH, Sandi KLAVŽAR, Douglas F. RALL. — **Topics in graph theory : graphs and their Cartesian product.** — Un vol. relié, 16×23,5, de XIV, 205 p. — ISBN 978-1-56881-429-2. — Prix : US$75.00. — A. K. Peters, Wellesley, Massachusetts, 2008.

From specialists in the field, learn about interesting connections and recent developments in the field of graph theory by looking in particular at Cartesian products – arguably the most important of the four standard graph products. Many new results in this area appear for the first time in print in this book. Written in an accessible way, this book could be used for personal development in higher applications of graph theory or for an advanced graph theory course. — Cartesian products : The Cartesian product. Hamming graphs and Hanoi graphs. — Classic topics : Hamiltonian graphs. Planarity and crossing number. Connectivity. Subgraphs. — Graphical invariants : Independence. Graph colourings. Additional types of colourings. Domination. Domination in Cartesian products. — Metric aspects : Distance lemma and Wiener index. Products and boxes. Canonical metric representation. — Algebraic and algorithmic issues : Prime factorizations. Cancellation and containment. Distinguishing number. Recognition algorithms.

Joseph P. S. KUNG, Gian-Carlo ROTA, Catherine H. YAN. — **Combinatorics : the Rota way.** — Un vol. broché, 15,5×23, de XII, 396 p. — ISBN 978-0-521-73794-4 (relié : 978-0-521-88389-4). — Prix : £22.99 (relié : £55.00). — Cambridge University Press, Cambridge, 2009.

Gian-Carlo Rota was one of the most original and colorful mathematicians of the twentieth century. His work on the foundations of combinatorics focused on revealing the algebraic structures that lie behind diverse combinatorial areas and created a new area of algebraic combinatorics. His graduate courses influenced generations of students. Written by two of his former students, this book is based on notes from his courses and on personal discussions with him. Topics include sets and valuations, partially ordered sets, distributive lattices, partitions and entropy, matching theory, free matrices, doubly stochastic matrices, Möbius functions, chains and antichains, Sperner theory, commuting equivalence relations and linear lattices, modular and geometric lattices, valuation rings, generating functions, umbral calculus, symmetric functions, Baxter algebras, unimodality of sequences, and location of zeros of polynomials. Many exercises and research problems are included and unexplored areas of possible research are discussed. This book should be on the shelf of all students and researchers in combinatorics and related areas.

Ordre, treillis

Steven GIVANT, Paul HALMOS. — **Introduction to Boolean algebras.** — Undergraduate texts in mathematics. — Un vol. relié, 16,5×24,5, de XIV, 574 p. — ISBN 978-0-387-40293-2. — Prix : €42.95. — Springer, New York, 2009.

In a bold and refreshingly informal style, this exciting text steers a middle course between elementary texts emphasizing connections with philosophy, logic, and electronic circuit design, and profound treatises aimed at advanced graduate students and professional mathematicians. It is written for readers who have studied at least two years of college-level mathematics. With carefully crafted prose, lucid explanations, and illuminating insights, it guides students to some of the deeper results of Boolean algebra – and in particular to the important interconnections with topology – without assuming a background in algebra, topology, and set theory. The parts of those subjects that are needed to understand the material are developed within the text itself. Highlights of the book include the normal form theorem; the homomorphism extension theorem;

the isomorphism theorem for countable atomless Boolean algebras; the maximal ideal theorem; the celebrated Stone representation theorem; the existence and uniqueness theorems for canonical extensions and completions; Tarski's isomorphism of factors theorem for σ-algebras, and Hanf's related counterexamples; and an extensive treatment of the algebraic-topological duality, including the duality between ideals and open sets, homomorphisms and continuous functions, subalgebras and quotient spaces, and direct products and Stone-Čech compactifications. A special feature of the book is the large number of exercises of varying levels of difficulty, from routine problems that help readers understand the basic definitions and theorems, to intermediate problems that extend or enrich material developed in the text, to harder problems that explore important ideas either not treated in the text, or that go substantially beyond its treatment. Hints for the solutions to the harder problems are given in an appendix. A detailed solutions manual for all exercises is available for instructors who adopt the text for a course.

Steven ROMAN. — **Lattices and ordered sets.** — Un vol. relié, 16×24,5, de XIV, 305 p. — ISBN 978-0-387-78900-2. — Prix: €46.95. — Springer, New York, 2009.

This book is intended to be a thorough introduction to the subject of ordered sets and lattices, with an emphasis on the latter. It can be used for a course at the graduate or advanced undergraduate level or for independent study. Prerequisites are kept to a minimum, but an introductory course in abstract algebra is highly recommended, since many of the examples are drawn from this area. The book has an excellent choice of topics, including a chapter on well ordering and ordinal numbers, which is not usually found in other texts. The approach is user-friendly and the presentation is lucid. There are more than 240 carefully chosen exercises. Topic coverage includes: modular, semimodular and distributive lattices, Boolean algebras, representation of distributive lattices, algebraic lattices, congruence relations on lattices, free lattices, fixed-point theorems, duality theory and more.

Théorie des nombres

Anatoli ANDRIANOV. — **Introduction to Siegel modular forms and Dirichlet series.** — Universitext. — Un vol. broché, 15,5×23,5, de XI, 182 p. — 978-0-387-78752-7. — Prix: €42.95. — Springer, New York, 2009.

Introduction to Siegel Modular Forms and Dirichlet Series gives a concise and self-contained introduction to the multiplicative theory of Siegel modular forms, Hecke operators, and zeta functions, including the classical case of modular forms in one variable. It serves to attract young researchers to this beautiful field and makes the initial steps more pleasant. It treats a number of questions that are rarely mentioned in other books. It is the first and only book so far on Siegel modular forms that introduces such important topics as analytic continuation and the functional equation of spinor zeta functions of Siegel modular forms of genus two. — *Unique features include*: New, simplified approaches and a fresh outlook on classical problems. — The abstract theory of Hecke-Shimura rings for symplectic and related groups. — The action of Hecke operators on Siegel modular forms. — Applications of Hecke operators to a study of the multiplicative properties of Fourier coefficients of modular forms. — The proof of analytic continuation and the functional equation (under certain assumptions) for Euler products associated with modular forms of genus two. — Numerous exercises.

J. P. BUHLER, P. STEVENHAGEN, (Editors). — **Algorithmic number theory : lattices, number fields, curves and cryptography.** — Mathematical Sciences Research Institute Publications, vol. 44. — Un vol. relié, 16,5×24,5, de X, 652 p. — ISBN 978-0-521-80854-5. — Prix: £50.00. — Cambridge University Press, Cambridge, 2008.

For centuries, number theorists have refined their intuition by computing examples. The advent of computers and (especially) sophisticated algorithms has gradually led to the emergence of algorithmic number theory as a distinct field. This young discipline has been shaped by strong connections to computer science, cryptography, and other parts of mathematics. One of its charms is that mathematical ideas often lead to better algorithms. Another striking feature is that the algorithmic worldview has led to fascinating new mathematical ideas and questions. This volume contains twenty survey articles on topics in algorithmic number theory, written by leading experts in the field. The first two are introductory, aiming to entice the reader into pursuing the subject more deeply. The next eight cover core areas of the field : factoring, primality, smooth numbers, lattices, elliptic curves, algebraic number theory, and fast arithmetic algorithms. The remaining ten articles survey specific topics, often with a distinctive perspective, including cryptography, Arakelov class groups, computational class field theory, zeta functions over finite fields, arithmetic geometry, and modular forms.

W. W. L. CHEN, W. T. GOWERS, H. HALBERSTAM, W. M. SCHMIDT, R. C. VAUGHAN. — **Analytic number theory : essays in honour of Klaus Roth.** — Un vol. relié, 16 × 23,5, de XVIII, 491 p. — ISBN 978-0-521-51538-2. — Prix : £60.00. — Cambridge University Press, Cambridge, 2009.

Klaus Roth's pioneering research in the field of number theory has led to important and substantial breakthroughs in many areas, including Diophantine approximation, irregularities of distribution and large sieve theory. His work on the Thue-Siegel-Roth theorem earned him a Fields Medal in 1958 – the first British mathematician to receive the honour. *Analytic Number Theory : Essays in Honour of Klaus Roth* comprises 32 essays from close colleagues and leading experts in those fields in which he has worked, and provides great insight into the historical development of the subject matter and the importance of Roth's contributions to number theory and beyond. His influence is also discussed in relation to more recent mathematical advances. Extensive lists of references make this a valuable source for research mathematicians in many areas, an introductory overview of the subject for beginning research students and a fitting long-awaited tribute to a truly great mathematician.

Bas EDIXHOVEN, Gerard VAN DER GEER, Ben MOONEN, (Editors). — **Modular forms on Schiermonnikoog.** — Un vol. relié, 16 × 23,5, de X, 350 p. — ISBN 978-0-521-49354-3. — Prix : £50.00. — Cambridge University Press, Cambridge, 2008.

Modular forms are functions with an enormous amount of symmetry, which play a central role in number theory, connecting it with analysis and geometry. They have played a prominent role in mathematics since the nineteenth century and their study continues to flourish today. They pop up in string theory and played a decisive role in the proof of Fermat's last theorem. Modular forms formed the inspiration to Langlands' conjectures and are expected to play an important role in the description of the cohomology of varieties defined over number fields. This collection of up-to-date articles originated from the conference "Modular forms" held on the island of Schiermonnikoog in the Netherlands in the autumn of 2006.

Pei-Chu HU, Chung-Chun YANG. — **Distribution theory of algebraic numbers.** — De Gruyter expositions in mathematics, vol. 45. — Un vol. relié, 18 × 24,5, de XI, 527 p. — ISBN 978-3-11-020536-7. — Prix : €110.28. — Walter de Gruyter, Berlin, 2008.

The book is a timely survey of new research results and related developments in Diophantine approximation, a division of number theory which deals with the approximation of real numbers by rational numbers. The book is appended with a list of challenging open problems and a comprehensive list of references. It is of interest to graduate students and researchers working in

the area of pure mathematics. *From the contents :* Field extensions. — Algebraic numbers. — Algebraic geometry. — Height functions. — The *abc*-conjecture. — Roth's theorem. — Subspace theorems. — Vojta's conjectures. — *L*-functions.

Michael J. JACOBSON, JR., Hugh C. WILLIAMS. — **Solving the Pell equation.** — CMS books in mathematics. — Un vol. relié, 16,5 × 24,5, de XX, 495 p. — ISBN 978-0-387-84922-5. — Prix : €54.95. — Springer, New York, 2009.

Pell's equation is a very simple, yet fundamental Diophantine equation which is believed to have been known to mathematicians for over 2000 years. Because of its popularity, the Pell equation is often discussed in textbooks and recreational books concerning elementary number theory, but usually not in much depth. This book provides a modern and deeper approach to the problem of solving the Pell equation. The main component of this will be computational techniques, but in the process of deriving these it will be necessary to develop the corresponding theory. One objective of this book is to provide a less intimidating introduction for senior undergraduates and others with the same level of preparedness to the delights of algebraic number theory through the medium of a mathematical object that has fascinated people since the time of Archimedes. To achieve this, this work is made accessible to anyone with some knowledge of elementary number theory and abstract algebra. Many references and notes are provided for those who wish to follow up on various topics, and the authors also describe some rather surprising applications to cryptography. The intended audience is number theorists, both professional and amateur, and students, but we wish to emphasize that this is not intended to be a textbook; its focus is much too narrow for that. It could, however be used as supplementary reading for students enrolled in a second course in number theory.

René SCHOOF. — **Catalan's conjecture.** — Universitext. — Un vol. broché, 15,5 × 23,5, de IX, 124 p. — ISBN 978-1-84800-184-8. — Prix : €39.95. — Springer, London, 2008.

Eugène Charles Catalan made his famous conjecture – that 8 and 9 are the only two consecutive perfect powers of natural numbers – in 1844 in a letter to the editor of Crelle's mathematical journal. One hundred and fifty-eight years later, Preda Mihăilescu proved it. *Catalan's Conjecture* presents this spectacular result in a way that is accessible to the advanced undergraduate. The first few sections of the book require little more than a basic mathematical background and some knowledge of elementary number theory, while later sections involve Galois theory, algebraic number theory and a small amount of commutative algebra. The prerequisites, such as the basic facts from the arithmetic of cyclotomic fields, are all discussed within the text. The author dissects both Mihăilescu's proof and the earlier work it made use of, taking great care to select streamlined and transparent versions of the arguments and to keep the text self-contained. Only in the proof of Thaine's theorem is a little class field theory used; it is hoped that this application will motivate the interested reader to study the theory further. Beautifully clear and concise, this book will appeal not only to specialists in number theory but to anyone interested in seeing the application of the ideas of algebraic number theory to a famous mathematical problem.

William STEIN. — **Elementary number theory : primes, congruences, and secrets : a computational approach.** — Undergraduate texts in mathematics. — Un vol. relié, 16 × 24,5, de X, 166 p. — ISBN 978-0-387-85525-7. — Prix : €34.95. — Springer, New York, 2009.

The systematic study of number theory was initiated around 300 B.C. when Euclid proved that there are infinitely many prime numbers. At the same time, he also cleverly deduced the fundamental theorem of arithmetic, which asserts that every positive integer factors uniquely as a product of primes. Over 1000 years later (around 972 A.D.) Arab mathematicians formulated the congruent number problem that asks for a way to decide whether or not a given positive

integer n is the area of a right triangle, all three of whose sides are rational numbers. Then another 1000 years later (in 1976), Diffie and Hellman introduced the first ever public-key cryptosystem, which enabled two people to communicate secretly over a public communications channel with no predetermined secret; this invention and the ones that followed it revolutionized the world of digital communication. In the 1980s and 1990s, elliptic curves revolutionized number theory, providing striking new insights into the congruent number problem, primality testing, public-key cryptography, attacks on public-key systems, and playing a central role in Andrew Wiles' resolution of Fermat's Last Theorem. Today, pure and applied number theory is an exciting mix of simultaneously broad and deep theory, which is constantly informed and motivated by algorithms and explicit computation. Active research is underway that promises to resolve the congruent number problem, deepen our understanding into the structure of prime numbers, and both challenge and improve our ability to communicate securely. The goal of this book is to bring the reader closer to this world. Each chapter contains exercises, and throughout the text there are examples of calculations done using the powerful free open source mathematical software system Sage. The reader should know how to read and write mathematical proofs and must know the basics of groups, rings, and fields. Thus, the prerequisites for this book are more than the prerequisites for most elementary number theory books, while still being aimed at undergraduates.

Corps et polynômes

Steven H. WEINTRAUB. — **Galois theory.** — Second edition. — Universitext. — Un vol. broché, 15,5×23,5, de XI, 211 p. — ISBN 978-0-387-87574-3. — Prix: €42.95. — Springer, New York, 2009.

The book discusses classical Galois theory in considerable generality, treating fields of characteristic zero and of positive characteristic with consideration of both separable and inseparable extensions, but with a particular emphasis on algebraic extensions of the field of rational numbers. While most of the book is concerned with finite extensions, it discusses algebraic closure and infinite Galois extensions, and concludes with a new chapter on transcendental extensions. Key topics and features of this second edition: Approaches Galois theory from the linear algebra point of view, following Artin. — Presents a number of applications of Galois theory, including symmetric functions, finite fields, cyclotomic fields, algebraic number fields, solvability of equations by radicals, and the impossibility of solution of the three geometric problems of Greek antiquity.

Algèbre linéaire et multilinéaire, théorie des matrices

Richard A. BRUALDI, Dragoš CVETKOVIĆ. — **A combinatorial approach to matrix theory and its applications.** — Discrete mathematics and its applications. — Un vol. relié, 16,5×24,5, de XIII, 267 p. — ISBN 978-1-4200-8223-4. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2009.

Unlike elementary books on matrices, *A Combinatorial Approach to Matrix Theory and Its Applications* employs combinatorial and graph-theoretical tools to develop basic theorems of matrix theory, shedding new light on the subject by exploring the connections of these tools to matrices. The book explains the algebra of matrices and uses the König digraph to carry out simple matrix operations. It then discusses matrix powers, provides a graph-theoretical definition of the determinant, and presents a graph-theoretical interpretation of matrix inverses. The authors develop the elementary theory of solutions of systems of linear equation and show how to use

the Coates digraph to solve a linear system. They also explore the eigenvalues, eigenvectors, and characteristic polynomial of a matrix as well as examine the important properties of nonnegative matrices that are part of the Perron-Frobenius theory. The final chapter presents applications to electrical engineering, physics, and chemistry. Using combinatorial and graph theoretical tools, this book enables a solid understanding of the fundamentals of matrix theory and its applications to scientific areas. *Features:* Places combinatorial and graph- theoretical tools at the forefront of the development of matrix theory. — Fosters a better understanding of matrix theory by using graphs to explain basic matrix construction, formulas, computations, ideas, and results. — Presents material rarely found in other books art this level, including Gersgorin's theorem and its extensions, the Kronecker product of matrices, sign-nonsingular matrices, and the evaluation of the permanent matrix. — Includes a combinatorial argument for the classical Cayley-Hamilton theorem and a combinatorial proof of the Jordan canonical form of a matrix. Describes several applications of matrices in electrical engineering, physics, and chemistry.

Anneaux et algèbres

Rüdiger GÖBEL, Brendan GOLDSMITH, (Editors). — **Models, modules and Abelian groups : in memory of A. L. S. Corner.** — Un vol. relié, 18×24,5, de IX, 497 p. — ISBN 978-3-11-019437-1. — Prix: €128.97. — Walter de Gruyter, Berlin, 2008.

This memorial volume contains refereed contributions of colleagues and friends of A. L. S. Corner, formerly Fellow and Tutor in Mathematics at Worcester College, Oxford. These contributions are related to the research interests of Corner who published important results on algebra and its interaction with set theory, especially on the endomorphism algebras of modules and Abelian groups. The volume also contains an important, previously unpublished paper by Corner on the characterization of those finite groups which can occur as the automorphism groups of torsion-free Abelian groups. The book is of interest to graduate students and researchers working in the areas of algebra and model-theoretic algebra.

Théorie des groupes et généralisations

Yakov BERKOVICH. — **Groups of prime power order, volume 1.** — De Gruyter expositions in mathematics, vol. 46. — Un vol. relié, 17,5×24,5, de XX, 512 p. — ISBN 978-3-11-020418-6. — Prix: €91.59. — Walter de Gruyter, Berlin, 2008.

This is the first of three volumes of a comprehensive and elementary treatment of finite p-group theory. Topics covered in this monograph include: Counting of subgroups, with almost all main counting theorems being proved. — Regular p-groups and regularity criteria. — p-groups of maximal class and their numerous characterizations. — Characters of p-groups. — p-groups with large Schur multiplier and commutator subgroups. — $(p-1)$-admissible Hall chains in normal subgroups. — Powerful p-groups. — Automorphisms of p-groups. — p-groups all of whose nonnormal subgroups are cyclic. — Alperin's problem on Abelian subgroups of small index. The book is suitable for researchers and graduate students of mathematics with a modest background in algebra. It also contains hundreds of original exercises (with difficult exercises being solved) and a comprehensive list of about 700 open problems.

Yakov BERKOVICH, Zvonimir JANKO. — **Groups of prime power order, volume 2.** — De Gruyter expositions in mathematics, vol. 47. — Un vol. relié, 17,5×24,5, de XV, 596 p. — ISBN 978-3-11-020419-3. — Prix: €91.59. — Walter de Gruyter, Berlin, 2008.

This is the second of three volumes devoted to elementary finite p-group theory. Similar to the first volume, hundreds of important results are analyzed and, in many cases, simplified. Important topics presented in this monograph include: Classification of p-groups all of whose cyclic subgroups of composite orders are normal. — Classification of 2-groups with exactly three involutions. — Two proofs of Ward's theorem on quaternion-free groups. — 2-groups with small centralizers of an involution. — Classification of 2-groups with exactly four cyclic subgroups of order $2^n > 2$. — Two new proofs of Blackburn's theorem on minimal nonmetacyclic groups. — Classification of p-groups all of whose subgroups of index p^2 are Abelian. — Classification of 2-groups all of whose minimal nonabelian subgroups have order 8. — p-groups with cyclic subgroups of index p^2 are classified. This volume contains hundreds of original exercises (with all difficult exercises being solved) and an extended list of about 700 open problems. The book is based on volume 1, and it is suitable for researchers and graduate students of mathematics with a modest background on algebra.

Ian CHISWELL. — **A course in formal languages, automata and groups.** — Universitext. — Un vol. broché, 15,5×23,5, de IX, 157 p. — ISBN 978-1-84800-939-4. — Prix: €34.95. — Springer, London, 2009.

Based on the author's lecture notes for a master's course, this text combines formal languages, automata theory and groups, a thriving research area that has developed extensively over the last twenty-five years. The aim of the first three chapters is to give a rigorous proof that various notions of recursively enumerable language are equivalent. Chapter 1 begins with languages defined by Chomsky grammars and the idea of machine recognition, contains a discussion of Turing machines, and includes work on finite state automata and the languages they recognise. The following chapters then focus on topics such as recursive functions and predicates; recursively enumerable sets of natural numbers; and the group-theoretic connections with language theory, including a brief introduction to automatic groups. — *Highlights include:* A comprehensive study of context-free languages and pushdown automata in Chapter 4, in particular a clear and complete account of the connection between LR(k) languages and deterministic context-free languages. — A self-contained discussion of the significant Muller-Schupp result on context-free groups. Enriched with precise definitions, clear and succinct proofs, and worked examples, the book is aimed primarily at postgraduate students in mathematics, but will also be of great interest to researchers in mathematics and computer science who want to learn more about the interplay between group theory and formal languages. A solutions manual is available to instructors via www.springer.com.

Groupes topologiques, groupes et algèbres de Lie

Sergei SILVESTROV, Eugen PAAL, Viktor ABRAMOV, Alexander STOLIN, (Editors). — **Generalized Lie theory in mathematics, physics and beyond.** — Un vol. relié, 16×24, de XVII, 305 p. — ISBN 978-3-540-85331-2. — Prix: €79.95. — Springer, Berlin, 2009.

The goal of this book is to extend the understanding of the fundamental role of generalizations of Lie theory and related non-commutative and non-associative structures in mathematics and physics. This volume is devoted to the interplay between several rapidly expanding research fields in contemporary mathematics and physics concerned with generalizations of the main structures of Lie theory aimed at quantization and discrete and non-commutative extensions of differential calculus and geometry, non-associative structures, actions of groups and semi-groups, non-commutative dynamics, non-commutative geometry and applications in physics and beyond. The book will be a useful source of inspiration for a broad spectrum of researchers and for

research students, and includes contributions from several large research communities in modern mathematics and physics. This volume consists of 5 parts comprising 25 chapters, which were contributed by 32 researchers from 12 different countries. All contributions in the volume have been refereed.

Mesure et intégration

Claude TRICOT. — **Géométries et mesures fractales : une introduction.** — Un vol. broché, 16,5 × 24, de XI, 439 p. — ISBN 978-2-7298-4045-7. — Prix : €33.00. — Ellipses, Paris, 2008.

Il n'est pas besoin de longs détours pour aborder l'analyse fractale. Topologie, algèbre linéaire, probabilités... Ce qui peut servir est introduit ou rappelé dans cet ouvrage. D'où sa longueur relative, mais le but est de permettre au lecteur de faire une précieuse économie de temps, celui de la lecture préalable de manuels spécialisés. Les deux notions essentielles sont celle d'orbite et celle de mesure. Les premiers chapitres étudient les orbites d'un point par une application contractante, puis les orbites d'un ensemble par une famille d'applications contractantes. Comment prévoir la forme d'un attracteur ? Pourquoi des valeurs propres complexes introduisent-elles un effet de spirale ? La deuxième partie traite de la dimension de boîtes (la dimension fractale des expérimentateurs), puis viennent les dimensions de recouvrement (Hausdorff) et d'empilement (packing dimension) et l'analyse des mesures fractales. Ce livre s'adresse avant tout à l'étudiant ou au chercheur non spécialisé. Des exercices, dont certains sont des applications immédiates du texte, sont donnés au fil de la lecture, avec solutions dans le dernier chapitre. L'enseignant y trouvera aussi un certain nombre de sujets de réflexion pouvant servir à des projets de fin d'études. Les développements mathématiques sont traités d'une manière constructive, et autant que possible, géométrique. D'où le nombre des figures.

Fonctions d'une variable complexe

Olli MARTIO, Vladimir RYAZANOV, Uri SREBRO, Eduard YAKUBOV. — **Moduli in modern mapping theory.** — Springer monographs in mathematics. — Un vol. relié, 16,5 × 24,5, de XII, 367 p. — ISBN 978-0-387-85586-8. — Prix : €66.95. — Springer, New York, 2009.

The purpose of this book is to present a modern account of mapping theory with emphasis on quasiconformal mapping and its generalizations. The modulus method was initiated by Arne Beurling and Lars Ahlfors to study conformal mappings, and later this method was extended and enhanced by several others. The techniques are geometric and they have turned out to be an indispensable tool in the study of quasiconformal and quasiregular mappings as well as their generalizations. The book is based on recent research papers and extends the modulus method beyond the classical applications of the modulus techniques presented in many monographs.

Fonctions de plusieurs variables complexes

Alberto SARACCO. — **Extension problems in complex and CR-geometry.** — Tesi – Theses, vol. 9. — Un vol. broché, 15,5 × 24, de XIV, 153 p. — ISBN 978-88-7642-338-3. — Prix : SFr. 30.00. — Edizioni della Normale, Pisa, distributed by Birkhäuser, Basel, 2008.

This book is both a survey of some aspects of extension problems in complex analysis and geometry and a collection of results by the author. After recalling the preliminary and necessary notions of complex analysis, the survey focuses on extension of holomorphic functions

(filling both compact and non-compact holes), on the reflection principle, on extension results via cohomology vanishing, and on the boundary problem. The last two subjects include detailed results by the author on non-compact extension: the cohomology of semi q-coronae and the unbounded boundary problem.

Équations différentielles ordinaires

Ravi P. AGARWAL, Donal O'REGAN. — **An introduction to ordinary differential equations.** — Universitext. —Un vol. broché, 15,5×23,5, de XII, 321 p. — ISBN 978-0-387-71275-8. — Prix: €39.95. — Springer, New York, 2008.

This textbook provides a rigorous and lucid introduction to the theory of ordinary differential equations (ODEs), which serve as mathematical models for many exciting real-world problems in science, engineering, and other disciplines. *Key features of this textbook:* Effectively organizes the subject into easily manageable sections in the form of 42 class-tested lectures. — Provides a theoretical treatment by organizing the material around theorems and proofs. — Uses detailed examples to drive the presentation. — Includes numerous exercise sets that encourage pursuing extensions of the material, each with an "answers or hints" section. — Covers an array of advanced topics which allow for flexibility in developing the subject beyond the basics. — Provides excellent grounding and inspiration for future research contributions to the field of ODEs and related areas. This book is ideal for a senior undergraduate or a graduate-level course on ordinary differential equations. Prerequisites include a course in calculus.

Malcolm A. H. MACCALLUM, Alexander V. MIKHAILOV, (Editors). — **Algebraic theory of differential equations.** — London Mathematical Society lecture note series, vol. 357. — Un vol. broché, 15×23, de VIII, 240 p. — ISBN 978-0-521-72008-3. — Prix: £40.00. — Cambridge University Press, Cambridge, 2009.

Integration of differential equations is a central problem in mathematics, and several approaches have been developed by studying analytic, algebraic, and algorithmic aspects of the subject. One of these is differential Galois theory, developed by Kolchin and his school, and another originates from the soliton theory and inverse spectral transform method, which was born in the works of Kruskal, Zabusky, Gardner, Green, and Miura. Many other approaches have also been developed, but there has so far been no intersection between them. This unique introduction to the subject finally brings them together, with the aim of initiating interaction and collaboration between these various mathematical communities. The collection includes a LMS Invited Lecture Course by Michael F. Singer, together with some shorter lecture courses and review articles, all based upon a mini-program held at the International Centre for Mathematical Sciences (ICMS) in Edinburgh.

Équations aux dérivées partielles

Ovidiu COSTIN. — **Asymptotics and Borel summability.** — Chapman & Hall/CRC monographs and surveys in pure and applied mathematics, vol. 141. — Un vol. relié, 16,5×24,5, de XIII, 250 p. — ISBN 978-1-4200-7031-6. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2009.

Incorporating substantial developments from the last thirty years into one resource, *Asymptotics and Borel Summability* provides a self-contained introduction to asymptotic analysis with special emphasis on topics not covered in traditional asymptotics books. The author explains basic ideas,

concepts, and methods of generalized Borel summability, transseries, and exponential asymptotics. He provides complete mathematical rigor while supplementing it with heuristic material and examples, so that some proofs may be omitted by applications-oriented readers. To give a sense of how new methods are used in a systematic way, the book analyzes in detail general nonlinear ordinary differential equations (ODEs) near a generic irregular singular point. It enables readers to master basic techniques, supplying a firm foundation for further study at more advanced levels. The book also examines difference equations, partial differential equations (PDEs), and other types of problems. Chronicling the progress made in recent decades, this book shows how Borel summability can recover exact solutions from formal expansions, analyze singular behaviour, and vastly improve accuracy in asymptotic approximations. *Features :* Reviews the fundamentals of asymptotics and Borel summation, including the Laplace method, Watson's lemma, and Banach spaces. — Contains topics not found in traditional asymptotics books. — Provides an introduction to generalized Borel summability, transseries, and exponential asymptotics. — Explores solutions to singularly perturbed equations. — Supplements mathematical rigor with many examples. — Includes both standard and challenging exercises.

Janusz MIERCZYŃSKI, Wenxian SHEN. — **Spectral theory for random and nonautonomous parabolic equations and applications.** — Chapman & Hall/CRC monographs and surveys in pure and applied mathematics, vol. 139. — Un vol. relié, 16,5×24,5, de XIII, 317 p. — ISBN 978-1-58488-895-6. — Prix: US$89.95. — Chapman & Hall/CRC, Boca Raton, Florida, 2009.

Providing a basic tool for studying nonlinear problems, *Spectral Theory for Random and Nonautonomous Parabolic Equations and Applications* focuses on the principal spectral theory for general time-dependent and random parabolic equations and systems. The text contains many new results and considers existing results from a fresh perspective. Taking a clear, unified, and self-contained approach, the authors first develop the abstract general theory in the framework of weak solutions, before turning to cases of random and nonautonomous equations. They prove that time dependence and randomness do not reduce the principal spectrum and Lyapunov exponents of nonautonomous and random parabolic equations. The book also addresses classical Faber-Krahn inequalities for elliptic and time-periodic problems and extends the linear theory for scalar nonautonomous and random parabolic equations to cooperative systems. The final chapter presents applications to Kolmogorov systems of parabolic equations. By thoroughly explaining the spectral theory for nonautonomous and random linear parabolic equations, this resource reveals the importance of the theory in examining nonlinear problems. *Features :* Presents a unified, self-contained account of the spectral theory for time-dependent linear parabolic equations. — Discusses various techniques for studying the linear theory of nonautonomous and random parabolic equations and coupled systems. — Provides deep insight into the effect of time and spatial variations on the dynamics of underlying problems. — Illustrates how the shape of domain affects the principal spectrum and Lyapunov exponents of nonautonomous and random parabolic equations. — Extends the linear theory for scalar nonautonomous and random parabolic equations to cooperative systems of such equations, enabling an understanding of the dynamics of nonlinear cooperative systems. — Explores applications of the principal spectral theory to the uniform persistence of competitive Kolmogorov systems of nonautonomous and random parabolic equations.

Alan D. RENDALL. — **Partial differential equations in general relativity.** — Oxford graduate texts in mathematics, vol. 16. — Un vol. broché, 16×23,5, de XVI, 279 p. — ISBN 978-0-19-921541-6. — Prix: £29.95. — Oxford University Press, Oxford, 2008.

In recent years the theory of partial differential equations has played an ever more important role in research on general relativity and in this text Alan Rendall covers the key themes –

matter models and symmetry classes; the most important classes of partial differential equations, including ordinary differential equations; and material on functional analysis – before discussing a variety of important examples in the field of mathematical relativity including asymptotically flat spacetimes, which are used to describe isolated systems, and spatially compact spacetimes, which are of importance in cosmology. Including simple explanations of the key terms, many of the basic formulae and equations, a variety of background material, and an extensive list of further reading with each chapter, this text is written in a style accessible to both physics and mathematics graduates.

Sergey REPIN. — **A posteriori estimates for partial differential equations.** — Radon series on computational and applied mathematics, vol. 4. — Un vol. relié, 17,5 × 25,5, de XI, 316 p. — ISBN 978-3-11-019153-0. — Prix: €59.81. — Walter de Gruyter, Berlin, 2008.

This book is devoted to a posteriori error estimates for mathematical problems based on partial differential equations. It begins with a concise overview of various a posteriori error estimation methods developed in the 20th century. The subsequent main chapters of the book are devoted to a new functional approach to a posteriori error control developed in the last decade. The main idea of this approach is as follows: an integral identity that defines a generalized solution is a source of guaranteed and computable bounds of the difference between this solution and any function from the corresponding energy space; those bounds can be derived by purely functional analytic methods without attracting specific features of approximations or numerical methods. The basic ideas of this approach are presented by means of a simple elliptic problem, and the following chapters are devoted to particular classes of problems, e.g., diffusion, linear elasticity, variational inequalities. Their intention is not only to present new estimates but to consider the methods used for deriving them. The latter is of importance since the understanding of basic ideas allows to derive a posteriori estimates for concrete problems of interest. The text requires a moderate background in functional analysis and the theory of PDE's only. It will be useful for experts in computational mathematics, as well as for students specializing in applied mathematics.

Sandro SALSA. — **Partial differential equations in action : from modeling to theory.** — Universitext. — Un vol. broché, 15,5 × 23,5, de XV, 556 p. — ISBN 978-88-470-0751-2. — Prix: €39.95. — Springer, Milan, 2008.

This book is designed as an advanced undergraduate or a first-year graduate course for students from various disciplines like applied mathematics, physics and engineering. The main purpose is on the one hand to train the students to appreciate the interplay between theory and modeling in problems arising in the applied sciences; on the other hand to give them a solid theoretical background for numerical methods, such as finite elements. At the end of each chapter, a number of exercises at different levels of complexity is included. The most demanding problems are supplied with answers or hints. The exposition is flexible enough to allow substantial changes in the presentation of the arguments without compromising the comprehension and to facilitate a selection of topics for a one or two semester course.

Systèmes dynamiques et théorie ergodique

Felipe LINARES, Gustavo PONCE. — **Introduction to nonlinear dispersive equations.** — Universitext. — Un vol. broché, 15,5 × 23,5, de XI, 256 p. — ISBN 978-0-387-84898-3. — Prix: €37.40. — Springer, New York, 2009.

The aim of this textbook is to introduce the theory of nonlinear dispersive equations to graduate students in a constructive way. The first three chapters are dedicated to preliminary

material, such as Fourier transform, interpolation theory and Sobolev spaces. The authors then proceed to use the linear Schrödinger equation to describe properties enjoyed by general dispersive equations. This information is then used to treat local and global well-posedness for the semi-linear Schrödinger equations. The end of each chapter contains recent developments and open problems, as well as exercises.

Alberto A. PINTO, David A. RAND, Flávio FERREIRA. — **Fine structures of hyperbolic diffeomorphisms.** — Springer monographs in mathematics. — Un vol. relié, 16,5×24,5, de XVI, 353 p. — ISBN 978-3-540-87524-6. — Prix: €79.95. — Springer, Berlin, 2009.

The study of hyperbolic systems is a core theme of modern dynamics. On surfaces the theory of the fine scale structure of hyperbolic invariant sets and their measures can be described in a very complete and elegant way, and is the subject of this book, largely self-contained, rigorously and clearly written. It covers the most important aspects of the subject and is based on several scientific works of the leading research workers in this field. This book fills a gap in the literature of dynamics. We highly recommend it for any Ph.D. student interested in this area. The authors are well-known experts in smooth dynamical systems and ergodic theory.

Approximations et développements en série

Sorin G. GAL. — **Shape-preserving approximation by real and complex polynomials.** — Un vol. relié, 16×24, de XIII, 352 p. — ISBN 978-0-8176-4702-5. — Prix: SFr. 115.00. — Birkhäuser, Basel, 2008.

This monograph presents the first comprehensive treatment in book form of shape-preserving approximation by real or complex polynomials in one or several variables. Such approximation methods are useful in many problems that arise in science and engineering and require an optimal mathematical representation of physical reality. The main topics are structured in four chapters, followed by an appendix: shape-preserving approximation and interpolation of real functions of one real variable by real polynomials; shape-preserving approximation of real functions of several real variables by multivariate real polynomials; shape-preserving approximation of analytic functions of one complex variable by complex polynomials in the unit disk; and shape-preserving approximation of analytic functions of several complex variables on the unit ball or the unit polydisk by polynomials of several complex variables. The appendix treats related results of non-polynomial and non-spline approximations preserving shape including those by complexified operators with applications to complex partial differential equations. *Shape-Preserving Approximation by Real and Complex Polynomials* contains many open problems at the end of each chapter to stimulate future research along with a rich and updated bibliography surveying the vast literature. The text will be useful to graduate students and researchers interested in approximation theory, mathematical analysis, numerical analysis, computer aided geometric design, robotics, data fitting, chemistry, fluid mechanics, and engineering.

Théorie des opérateurs

Damir Z. AROV, Harry DYM. — ***J*-contractive matrix valued functions and related topics.** — Encyclopedia of mathematics and its applications, vol. 116. — Un vol. relié, 16,5×24, de XI, 575 p. — ISBN 978-0-521-88300-9. — Prix: £70.00. — Cambridge University Press, Cambridge, 2008.

Matrix valued functions have a wide range of applications in mathematical analysis, mathematical physics, control engineering and the mathematical theory of systems and networks. This self-contained book gives a comprehensive introduction to the theory of J-contractive and J-inner matrix valued functions with respect to the open upper half plane and a number of applications of this theory. The first part of the book is devoted to developing requisite background material in the geometry of finite dimensional spaces with an indefinite inner product and in assorted classes of meromorphic and holomorphic matrix valued functions. Subsequent chapters develop the theory of J-contractive and J-inner matrix valued functions, associated pairs of inner matrix valued functions and reproducing kernel Hilbert spaces. Special attention is paid to the subclasses of regular and strongly regular J-inner matrix valued functions, which play an essential role in the study of the extension and interpolation problems discussed in the second half of the book. Applications to operator nodes, system theory, Darlington realizations and entropy functionals are also included.

Luigi RODINO, M. W. WONG, (Editors). — **New developments in pseudo-differential operators : ISAAC Group in Pseudo-Differential Operators (IGPDO), Middle East Technical University, Ankara, Turkey, August 2007.** — Operator theory : advances and applications, vol. 189. — Un vol. relié, 17 × 24, de VIII, 332 p. — ISBN 978-3-7643-8968-0. — Prix : SFr. 239.00. — Birkhäuser, Basel, 2009.

This volume consists of seventeen peer-reviewed papers related to lectures on pseudo-differential operators presented at the meeting of the ISAAC Group in Pseudo-Differential Operators (IGPDO) held at the Middle East Technical University in Ankara, Turkey on August 13–18, 2007, and invited papers by experts in the field. Included in this volume are such topics as analysis and partial differential equations related to the Heisenberg group; global analysis and pseudo-differential analysis on non-compact manifolds and manifolds with singularities; Fourier integral operators and Colombeau algebras with applications to partial differential equations; exotic pseudo-differential operators and regularity results on quasi-elliptic operators and hypoelliptic operators; Stockwell transforms in time-frequency analysis; and pseudo-differential operators on Lie groups with related results to sampling. This volume is a useful complement to the volumes *Advances in Pseudo-Differential Operators*, *Pseudo-Differential Operators and Related Topics* and *Modern Trends in Pseudo-Differential Operators* published in the same series in, respectively, 2004, 2006 and 2007.

Géométrie

Susan BARWICK, Gary EBERT. — **Unitals in projective planes.** — Springer monographs in mathematics. — Un vol. relié, 16,5 × 24,5, de XII, 193 p. — ISBN 978-0-387-76364-4. — Prix : €54.95. — Springer, New York, 2008.

This clearly written text is the first book on unitals embedded in finite projective planes. Unitals are key structures in square order projective planes, and have connections with other structures in algebra. They provide a link between groups and geometries. There is a considerable number of research articles concerning unitals, and there also exist many open problems. This book is a thorough survey of the research literature on embedded unitals which collects this material in book form for the first time. The book is aimed at graduate students and researchers who want to learn about this topic without reading all the original articles. The primary proof techniques used involve linear algebraic arguments, finite field arithmetic, some elementary number theory, and combinatorial enumeration. Some computer results not previously found in the literature also

are mentioned in the text. The authors have included a comprehensive bibliography which will become an invaluable resource.

Marc TROYANOV. — **Cours de géométrie.** — Enseignement des sciences. — Un vol. broché, 16×24, de XIV, 358 p. — ISBN 978-2-88074-817-3. — Prix: SFr. 64.50. — Presses polytechniques et universitaires romandes, 2009.

Ce cours d'introduction à la géométrie propose une vision et une pensée solides ainsi qu'une initiation aux applications de la géométrie. Rigoureuse dans son approche, la matière est exposée sous forme de principes premiers, dont tous les théorèmes sont démontrés. L'utilisation de l'algèbre linéaire en géométrie est par ailleurs justifiée mathématiquement et non uniquement de façon heuristique. L'exposé débute par une fondation axiomatique de l'espace euclidien, avant que ne soient prouvées les propriétés algébriques des vecteurs. Une présentation complète de la géométrie vectorielle ainsi qu'une introduction à la géométrie différentielle complètent l'ouvrage. Les notions étudiées sont illustrées d'exemples et d'applications concrètes, et chaque chapitre se clôt par de nombreux exercices. Ce manuel est principalement destiné aux étudiants de premier cycle en sciences et sciences de l'ingénieur, et constitue aussi une solide référence pour les physiciens et les mathématiciens.

Géométrie différentielle

Detlef GROMOLL, Gerard WALSCHAP. — **Metric foliations and curvature.** — Progress in mathematics, vol. 268. — Un vol. relié, 16×24, de VIII, 174 p. — ISBN 978-7643-8714-3. — Prix: SFr. 69.90. — Birkhäuser, Basel, 2009.

In the past three or four decades, there has been increasing realization that metric foliations play a key role in understanding the structure of Riemannian manifolds, particularly those with positive or nonnegative sectional curvature. In fact, all known such spaces are constructed from only a representative handful by means of metric fibrations or deformations thereof. This text is an attempt to document some of these constructions, many of which have only appeared in journal form. The emphasis here is less on the fibration itself and more on how to use it to either construct or understand a metric with curvature of fixed sign on a given space.

Martin A. GUEST. — **From quantum cohomology to integrable systems.** — Oxford graduate texts in mathematics, vol. 15. — Un vol. relié, 16,5×24, de XXIX, 305 p. — ISBN 978-0-19-856599-4. — Prix: £45.00. — Oxford University Press, Oxford, 2008.

Quantum cohomology has its origins in symplectic geometry and algebraic geometry, but is deeply related to differential equations and integrable systems. This text explains what is behind the extraordinary success of quantum cohomology, leading to its connections with many existing areas of mathematics as well as its appearance in new areas such as mirror symmetry. Certain kinds of differential equations (or D-modules) provide the key links between quantum cohomology and traditional mathematics; these links are the main focus of the book. Quantum cohomology and other integrable PDEs such as the KdV equation and the harmonic map equation are discussed within this unified framework. Aimed at graduate students in mathematics who want to learn about quantum cohomology in a broad context, and theoretical physicists who are interested in the mathematical setting, the text introduces all necessary concepts with ample motivation.

Topologie générale

Stephen Leon LIPSCOMB. — **Fractals and universal spaces in dimension theory.** — Springer monographs in mathematics. — Un vol. relié, 16,5 × 24,5, de XVII, 241 p. — ISBN 978-0-387-85493-9. — Prix : €54.95. — Springer, New York, 2009.

For metric spaces the quest for universal spaces in dimension theory spanned approximately a century of mathematical research. The history breaks naturally into two periods – the classical (separable metric) and the modern (not necessarily separable metric). While the classical theory is now well documented in several books, this is the first book to unify the modern theory (1960–2007). Like the classical theory, the modern theory fundamentally involves the unit interval. By the 1970s, the author of this monograph generalized Cantor's 1883 construction (identify adjacent-endpoints in Cantor's set) of the unit interval, obtaining – for any given weight – a one-dimensional metric space that contains rationals and irrationals as counterparts to those in the unit interval. Following the development of fractal geometry during the 1980s, these new spaces turned out to be the first examples of attractors of infinite iterated function systems – "generalized fractals". The use of graphics to illustrate the fractal view of these spaces is a unique feature of this monograph. In addition, this book provides historical context for related research that includes imbedding theorems, graph theory, and closed imbeddings. This monograph will be useful to topologists, to mathematicians working in fractal geometry, and to historians of mathematics. It can also serve as a text for graduate seminars of self-study – the interested reader will find many relevant open problems that will motivate further research into these topics.

Daniel SONDAZ. — **Introduction à la topologie : espaces topologiques métriques, normés : L3, Masters, CAPES, Agrégation.** — Avec la participation de Rémi MORVAN. — Bien maîtriser les mathématiques. — Un vol. broché, 14,5 × 20,5, de 157 p. — ISBN 978-2-85428-866-7. — Prix : €23.00. — Cépaduès-Éditions, Toulouse, 2008.

Cet ouvrage est une introduction à la topologie. Il s'adresse aux étudiants de L3 de mathématiques, de Masters de mathématiques pures et appliquées, aux étudiants des Ecoles d'ingénieurs, ainsi qu'aux étudiants qui préparent le C.A.P.E.S. et l'Agrégation de mathématiques. Il propose à la fois des rappels de cours et des exercices corrigés de façon particulièrement détaillée, classés par ordre de difficulté croissante. Le lecteur peut ainsi progresser à son rythme et de façon autonome dans cette discipline. Chaque chapitre est agrémenté de pages historiques, qui replacent les résultats énoncés dans leur contexte. Sont abordées dans ce premier fascicule de topologie, les notions d'espaces topologiques, d'espaces métriques et d'espaces normés, d'ouverts, fermés, adhérence, intérieur, etc. Les exercices proposés permettent au lecteur de maîtriser un large spectre d'exemples. Une fois ces notions assimilées, il pourra sans difficultés s'engager dans des études plus avancées.

Topologie des variétés, analyse globale et analyse des variétés

Masoud KHALKHALI, Matilde MARCOLLI, (Editors). — **An invitation to noncommutative geometry.** — Un vol. broché, 15,5 × 23, de 506 p. — ISBN 978-981-270-779-6 (relié : 978-981-270-616-4). — Prix : £36.00 (relié : £62.00). — World Scientific, Singapore, 2008.

This is the first existing volume that collects lectures on this important and fast developing subject in mathematics. The lectures are given by leading experts in the field and the range of topics is kept as broad as possible by including both the algebraic and the differential aspects of noncommutative geometry as well as recent applications to theoretical physics and number theory. — *Contents :* A. Connes and M. Marcolli : A walk in the noncommutative garden. — H. Grosse

and R. Wulkenhaar: Renormalization of noncommutative quantum field theory. — M. Khalkhali: Lectures on noncommutative geometry. — G. Landi and W. D. van Suijlekom: Noncommutative bundles and instantons in Tehran. — S. Mahanta: Lecture notes on noncommutative algebraic geometry and noncommutative tori. — B. Noohi: Lectures on derived and triangulated categories. — J. Plazas: Examples of noncommutative manifolds: complex tori and spherical manifolds. — R. J. Szabo: D-branes in noncommutative field theory.

Probabilités et processus stochastiques

Jochen BLATH, Peter MÖRTERS, Michael SCHEUTZOW, (Editors). — **Trends in stochastic analysis : Festschrift in honour of Heinrich von Weizsäcker.** — London Mathematical Society lecture note series, vol. 353. — Un vol. broché, 15×22,5, de VI, 390 p. — ISBN 978-0-521-71821-9. — Prix: £38.00. — Cambridge University Press, Cambridge, 2009.

Presenting important trends in the field of stochastic analysis, this collection of 13 articles provides an overview of recent developments and new results. Written by leading experts in the field, the articles cover a wide range of topics, ranging from an alternative set-up of rigorous probability to the sampling of conditioned diffusions. Applications in physics and biology are treated, with discussion of Feynman formulas, intermittency of Anderson models and genetic inference. A large number of the articles are topical surveys of probabilistic tools such as chaining techniques, and of research fields within stochastic analysis, including stochastic dynamics and multifractal analysis. Showcasing the diversity of research activities in the field, this book is essential reading for any student or researcher looking for a guide to modern trends in stochastic analysis and neighbouring fields.

Robert C. DALANG, Daniel CONUS. — **Introduction à la théorie des probabilités.** — Enseignement des mathématiques. — Un vol. broché, 16×24, de IX, 204 p. — ISBN 978-2-88074-794-7. — Prix: SFr. 45.00. — Presses polytechniques et universitaires romandes, Lausanne, 2008.

Cet ouvrage est une première introduction à la théorie mathématique des probabilités. Il présente avec rigueur les notions fondamentales du calcul des probabilités: les espaces de probabilités, les variables aléatoires discrètes et continues, leurs fonctions de répartition et de densité, de même que les notions d'espérance, d'espérance conditionnelle et les principaux théorèmes limites. Sans recourir à la théorie de la mesure, ce livre contient néanmoins une démonstration complète de chaque résultat présenté et, en particulier, du théorème limite central. Afin de faciliter l'assimilation de la matière, chaque chapitre se termine par un grand nombre d'exercices – tant élémentaires que plus théoriques – pour la plupart assortis d'une solution complète et détaillée, et des exercices de révision sont proposés en fin d'ouvrage. L'approche mathématique rigoureuse de cet ouvrage, qui ne nécessite cependant aucune connaissance préalable en théorie de la mesure, comble un vide entre les nombreux ouvrages d'introduction aux probabilités et les ouvrages avancés de théorie des probabilités basés sur la théorie de la mesure. Conçu comme support pour un premier cours de théorie des probabilités au sein des universités et grandes écoles d'ingénieurs, cet ouvrage s'adresse en priorité aux étudiants mathématiciens et à tous ceux très intéressés par les mathématiques.

Mats GYLLENBERG, Dmitrii S. SILVESTROV. — **Quasi-stationary phenomena in nonlinearly perturbed stochastic systems.** — De Gruyter expositions in mathematics, vol. 44. — Un vol. relié, 18×24,5, de XII, 579 p. — ISBN 978-3-11-020437-7. — Prix: €119.63. — Walter de Gruyter, Berlin, 2008.

The book is devoted to studies of quasi-stationary phenomena in nonlinearly perturbed stochastic systems. New methods of asymptotic analysis for nonlinearly perturbed stochastic processes based on new types of asymptotic expansions for perturbed renewal equation and recurrence algorithms for the construction of asymptotic expansions for Markov type processes with absorption are presented. Asymptotic expansions are given in mixed ergodic (for processes) and large deviation theorems (for absorption times) for nonlinearly perturbed regenerative processes, semi-Markov processes, and Markov chains. Applications to the analysis of quasi-stationary phenomena in nonlinearly perturbed queueing systems, population dynamics and epidemic models, and for risk processes are presented. The book also contains an extended bibliography of works in the area. It is an essential reference for theoretical and applied researchers in the field of stochastic processes and their applications that will contribute to the continuing extensive studies in the area and remain relevant for years to come.

Andrei KHRENNIKOV. — **Interpretations of probability.** — Second revised and extended edition. — Un vol. relié, 17,5×24,5, de XX, 217 p. — ISBN 978-3-11-020748-4. — Prix: €121.45. — Walter de Gruyter, Berlin, 2009.

This is the second and revised edition of the first fundamental book devoted to non-Kolmogorov probability models. In particular, it provides a mathematical theory of frequency probabilities (generalization of von Mises' approach), with applications to quantum physics, complexity, biology and psychology. Another nonconventional probabilistic model is the model with p-adic valued probabilities which proves to be useful in non-Archimedean theoretical physics, including superstring theory and quantum cosmology. In this framework negative probabilities can be introduced on the rigorous mathematical basis as (generalized) frequency probabilities. The new edition is completed with two chapters devoted to contextual probability, interference of probabilities, and representation of probabilities by complex probability amplitudes. The latter approach can be used for creation of quantum-like models in cognitive science, economy, finances, psychology, and political science. This book will be a useful source for graduate students and researchers interested in one of the areas mentioned above.

Achim KLENKE. — **Probability theory: a comprehensive course.** — Universitext. — Un vol. broché, 15,5×23,5, de XII, 616 p. — ISBN 978-1-84800-047-6. — Prix: €54.95. — Springer, London, 2008.

Probabilistic concepts play an increasingly important role in mathematics, physics, biology, financial engineering and computer science. They help us to understand magnetism, amorphous media, genetic diversity and the perils of random developments on the financial markets, and they guide us in constructing more efficient algorithms. This text is a comprehensive course in modern probability theory and its measure-theoretical foundations. Aimed primarily at graduate students and researchers, the book covers a wide variety of topics, many of which are not usually found in introductory textbooks, such as: limit theorems for sums of random variables; martingales; percolation; Markov chains and electrical networks; construction of stochastic processes; Poisson point processes and infinite divisibility; large deviation principles and statistical physics; Brownian motion; and stochastic integral and stochastic differential equations. The theory is developed rigorously and in a self-contained way, with the chapters on measure theory interlaced with the probabilistic chapters in order to display the power of the abstract concepts in the world of probability theory. In addition, plenty of figures, computer simulations, biographic details of key mathematicians, and a wealth of examples support and enliven the presentation.

Roger MANSUY, Marc YOR. — **Aspects of Brownian motion.** — Universitext. — Un vol. broché, 15,5×23,5, de XIII, 195 p. — ISBN 978-3-540-22347-4. — Prix : €39.95. — Springer, Berlin, 2008.

Stochastic calculus and excursion theory are very efficient tools to obtain either exact or asymptotic results about Brownian motion and related processes. The emphasis of this book is on special classes of such Brownian functionals as : Gaussian subspaces of the Gaussian space of Brownian motion ; Brownian quadratic functionals ; Brownian local times ; exponential functionals of Brownian motion with drift ; winding number of one or several Brownian motions around one or several points or straight lines, or curves ; time spent by Brownian motion below a multiple of its one-sided supremum. Besides its obvious audience of students and lecturers the book also addresses the interests of researchers from core probability theory out to applied fields such as polymer physics and mathematical finance.

Mark PINSKY, Björn BIRNIR, (Editors). — **Probability, geometry and integrable systems.** — Un vol. relié, 16,5×24,5, de XXIII, 403 p. — ISBN 978-0-521-89527-9. — Prix : £50.00. — Cambridge University Press, Cambridge, 2008.

The three main themes of this book – probability theory, differential geometry and the theory of integrable systems – reflect the broad range of mathematical interests of Henry McKean, to whom it is dedicated. Written by experts in probability, geometry, integrable systems, turbulence and percolation, the seventeen papers included here demonstrate a wide variety of techniques that have been developed to solve various mathematical problems in these areas. The topics are often combined in an unusual and interesting fashion to give solutions outside of the standard methods. The papers contain some exciting results and offer a guide to the contemporary literature on these subjects.

Rolf SCHNEIDER, Wolfgang WEIL. — **Stochastic and integral geometry.** — Probability and its applications. — Un vol. relié, 17×24, de XI, 693 p. — ISBN 978-3-540-78858-4. — Prix : €79.95. — Springer, Berlin, 2008.

Stochastic geometry has in recent years experienced considerable progress, both in its applications to other sciences and engineering, and in its theoretical foundations and mathematical expansion. This book, by two eminent specialists of the subject, provides a solid mathematical treatment of the basic models of stochastic geometry – random sets, point processes of geometric objects (particles, flats), and random mosaics. It develops, in a measure-theoretic setting, the integral geometry for the motion and the translation group, as needed for the investigation of these models under the usual invariance assumptions. A characteristic of the book is the interplay between stochastic and geometric arguments, leading to various major results. Its main theme, once the foundations have been laid, is the quantitative investigation of the basic models. This comprises the introduction of suitable parameters, in the form of functional densities, relations between them, and approaches to their estimation. Much additional information on stochastic geometry is collected in the section notes. As a combination of probability theory and geometry, the volume is intended for readers from either field. Probabilists with interest in random spatial structures, or motivated by the prospect of applications, will find an in-depth presentation of the geometric background. Geometers can see integral geometry "at work" and may be surprised to learn how classical results from convex geometry have elegant applications in a stochastic setting.

Yuri SUHOV, Mark KELBERT. — **Probability and statistics by example : II, Markov chains : a primer in random processes and their applications.** — Un vol. broché, 17,5×25, de IX, 487 p. — ISBN 978-0-521-61234-0 (relié : 978-0-521-84767-4). — Prix : £29.99 (relié : £70.00). — Cambridge University Press, Cambridge, 2008.

Probability and statistics are as much about intuition and problem solving as they are about theorem proving. Because of this, students can find it very difficult to make a successful transition from lectures to examinations to practice, since the problems involved can vary so much in nature. Since the subject is critical in many modern applications such as mathematical finance, quantitative management, telecommunications, signal processing and bioinformatics, as well as traditional ones such as insurance, social science and engineering, the authors have rectified deficiencies in traditional lecture-based methods by collecting together a wealth of exercises for which they have supplied complete solutions. These solutions are adapted to the needs and skills of students. Following on from the success of *Probability and Statistics by Example : Basic Probability and Statistics*, the authors here concentrate on random processes, particularly Markov processes, emphasising models rather than general constructions. Basic mathematical facts are supplied as and when they are needed and historical information is sprinkled throughout.

Analyse numérique

Jean-Philippe GRIVET. — **Méthodes numériques appliquées pour le scientifique et l'ingénieur.** — Collection Grenoble sciences. — Un vol. broché, 17×25, de 371 p. — ISBN 978-2-7598-0386-6. — Prix : €35.00. — EDP Sciences, Les Ulis, 2009.

De nombreux problèmes physiques ne peuvent pas être résolus analytiquement et conduisent à des calculs numériques. L'objectif de l'ouvrage est de donner des méthodes concrètes permettant de transcrire ces problèmes dans des logiciels fonctionnant sur la majorité des ordinateurs (utilisation quasi exclusive du logiciel gratuit Scilab, mais aussi de Maple…). L'originalité de *Méthodes numériques appliquées pour le scientifique et l'ingénieur* réside dans la pédagogie développée : chaque thème est introduit par les bases de mathématiques strictement nécessaires avant d'aborder la partie proprement numérique ; puis de nombreux exercices d'application sont proposés dans une progression judicieuse. Les problématiques usuelles sont ainsi présentées : interpolation, résolution d'équations non-linéaires, dérivation et intégration numériques, équations différentielles, systèmes d'équations linéaires, valeurs propres et vecteurs propres. Mais d'autres chapitres sont plus originaux : représentation graphique, polynômes orthogonaux, probabilités et erreurs, calcul et approximation de fonction, représentation de grandeurs physiques… Le lecteur trouvera ici une variété d'exercices et de projets issus de la physique qui lui permettront de s'approprier concrètement ces méthodes ; il utilisera cet ouvrage comme un recueil de recettes numériques pour les problèmes qu'il rencontre.

Victor ZALIZNIAK. — **Essentials of scientific computing : numerical methods in science and engineering.** — Un vol. broché, 15,5×23,5, de 218 p. — ISBN 978-1-904275-32-9. — Prix : £47.00. — Horwood Publishing, Chichester, U.K., 2008.

Modern development of science and technology is based to a large extent on computer modelling. To understand the principles and techniques of computer modelling, it is necessary to first develop a strong background in classical numerical methods. *Essentials of Scientific Computing* covers the basic ideas of different numerical techniques and the interrelation between them, including iterative process, extrapolation and matrix factorization. Practical implementations of the methods shown are explained clearly and concisely through numerous examples, considering a variety of methods for each type of problem. Appendices contain information on the nodes and weights of Gaussian type quadratures, transformations of some integration domains and stability regions for various schemes for ODE. An introduction to MATLAB is included, together with a brief overview of modern software widely used in scientific computations. Although intended

for use on a numerical methods course for engineering and science students, this text will also be invaluable to research students as a handbook on numerical techniques.

Économie, recherche opérationnelle, jeux

Jean-Baptiste HIRIART-URRUTY. — **Optimisation et analyse convexe : exercices corrigés, avec rappels de cours.** — Collection Enseignement sup. Mathématiques. — Un vol. broché, 17 × 24, de XI, 330 p. — ISBN 978-2-7598-0373-6. — Prix : €29.00. — EDP Sciences, Les Ulis, 2009.

Ce livre est un recueil d'exercices et problèmes corrigés, de difficulté graduée, accompagnés de commentaires sur l'utilisation du résultat obtenu, sur un prolongement possible et, occasionnellement, placés dans un contexte historique. Chaque chapitre débute par des rappels de définitions et résultats du cours. Le cadre de travail est volontairement simple, l'auteur a voulu insister sur les idées et mécanismes de base davantage que sur des généralisations possibles ou des techniques particulières à telle ou telle situation. Les connaissances mathématiques requises pour tirer profit du recueil ont été maintenues minimales, celles normalement acquises à Bac+3 (ou Bac+2 suivant les cas). L'approche retenue pour avancer est celle d'une progression en spirale plutôt que linéaire au sens strict. Pour ce qui est de l'enseignement, les aspects de l'optimisation et analyse convexe traités dans cet ouvrage trouvent leur place dans les formations de niveau M1, parfois L3, (modules généralistes ou professionnalisés) et dans la formation mathématique des ingénieurs (en 2^{e} année d'école, parfois en 1re année). La connaissance de ces aspects est un préalable à des formations plus en aval, en optimisation numérique par exemple.

Systèmes, contrôle

Alan BAIN, Dan CRISAN. — **Fundamentals of stochastic filtering.** — Stochastic modelling and applied probability, vol. 60. — Un vol. relié, 16,5 × 24,5, de XIII, 390 p. — ISBN 978-0-387-76895-3. — Prix : €42.95. — Springer, New York, 2009.

The objective of stochastic filtering is to determine the best estimate for the state of a stochastic dynamical system from partial observations. The solution of this problem in the linear case is the well known Kalman-Bucy filter which has found widespread practical application. The purpose of this book is to provide a rigorous mathematical treatment of the non-linear stochastic filtering problem using modern methods. Particular emphasis is placed on the theoretical analysis of numerical methods for the solution of the filtering problem via particle methods. The book should provide sufficient background to enable study of the recent literature. While no prior knowledge of stochastic filtering is required, readers are assumed to be familiar with measure theory, probability theory and the basics of stochastic processes. Most of the technical results that are required are stated and proved in the appendices. The book is intended as a reference for graduate students and researchers interested in the field. It is also suitable for use as a text for a graduate level course on stochastic filtering. Suitable exercises and solutions are included.

Vivek S. BORKAR. — **Stochastic approximation : a dynamical systems viewpoint.** — Un vol. relié, 16 × 23,5, de IX, 164 p. — ISBN 978-0-521-51592-4. — Prix : £35.00. — Cambridge University Press, Cambridge, Hindustan Book Agency, New Delhi, 2008.

This simple, compact toolkit for designing and analyzing stochastic approximation algorithms requires only basic literacy in probability and differential equations. Yet these algorithms have powerful applications – for example, in control and communications engineering, artificial

intelligence and economic modelling. The dynamical systems viewpoint treats an algorithm as a noisy discretization of a limiting differential equation and argues that, under reasonable hypotheses, it tracts the asymptotic behaviour of the differential equation with probability one. The limiting differential equation, which can usually be obtained by inspection, is easier to analyze. Novel topics covered in the book include finite-time behaviour, multiple timescales and asynchronous implementation. A separate chapter gives a useful taxonomy of applications, with concrete examples from engineering and economics. Notably it covers several variants of stochastic gradient-based optimization schemes, fixed-point solvers, which are commonplace in learning algorithms for approximate dynamic programming, and some models of collective behaviour. Three appendices give self-contained summaries of background material from analysis, differential equations and probability. Ideal for graduate students, researchers and practitioners in electrical engineering and computer science, especially those working in control, communications, signal processing and machine learning, this book is also relevant to economics, probability and statistics.

Jie XIONG. — **An introduction to stochastic filtering theory.** — Oxford graduate texts in mathematics, vol. 18. — Un vol. relié, 16,5×24, de XIII, 270 p. — ISBN 978-0-19-921970-4. — Prix: £45.00. — Oxford University Press, Oxford, 2008.

Stochastic filtering theory uses probability tools to estimate unobservable stochastic processes that arise in many applied fields including communication, target-tracking, and mathematical finance. As a topic, stochastic filtering theory has progressed rapidly in recent years. For example, the (branching) particle system representation of the optimal filter has been extensively studied to seek more effective numerical approximations of the optimal filter; the stability of the filter with 'incorrect' initial state, as well as the long term behavior of the optimal filter, has attracted the attention of many researchers and although still in its infancy, the study of singular filtering models has yielded exciting results. In this text, Jie Xiong introduces the reader to the basics of stochastic filtering theory before covering these key recent advances. The text is written in a style suitable for graduates in mathematics and engineering with a background in basic probability. — *Table of contents:* Introduction. — Brownian motion and martingales. — Stochastic integrals and Itô's formula. — Stochastic differential equations. — Filtering model and Kallianpur-Striebel formula. — Uniqueness of the solution for Zakai's equation. — Uniqueness of the solution for the filtering equation. — Numerical methods. — Linear filtering. — Stability of nonlinear filtering. — Singular filtering.

Information, communication, circuits

Norman L. BIGGS. — **Codes: an introduction to information communication and cryptography.** — Springer undergraduate mathematics series. — Un vol. broché, 18×23,5, de X, 273 p. — ISBN 978-1-84800-272-2. — Prix: €26.95. — Springer, London, 2008.

Information is an important feature of the modern world. Mathematical techniques underlie the devices that we use to handle it, for example, mobile phones, digital cameras, and personal computers. This book is an integrated introduction to the mathematics of coding, that is, replacing information expressed in symbols, such as a natural language or a sequence of bits, by another message using (possibly) different symbols. There are three main reasons for doing this: economy, reliability, and security, and each is covered in detail. Only a modest mathematical background is assumed, the mathematical theory being introduced at a level that enables the basic problems to be stated carefully, but without unnecessary abstraction. Other features include: Clear and careful exposition of fundamental concepts, including optimal coding, data compression, and public-key

cryptography. — Concise but complete proofs of results. — Coverage of recent advances of practical interest, for example in encryption standards, authentification schemes, and elliptic curve cryptography. — Numerous examples and exercises, and a full solutions manual available to lecturers from www.springer.com. This modern introduction to all aspects of coding is suitable for advanced undergraduate or postgraduate courses in mathematics, computer science, electrical engineering, or informatics. It is also useful for researchers and practitioners in related areas of science, engineering and economics.

Jeffrey HOFFSTEIN, Jill PIPHER, Joseph H. SILVERMAN. — **An introduction to mathematical cryptography.** — Undergraduate texts in mathematics. — Un vol. broché, 16 × 24,5, de XV, 523 p. — ISBN 978-0-387-77993-5. — Prix : €34.95. — Springer, New York, 2008.

This self-contained introduction to modern cryptography emphasizes the mathematics behind the theory of public key cryptosystems and digital signature schemes. The book focuses on these key topics while developing the mathematical tools needed for the construction and security analysis of diverse cryptosystems. Only basic linear algebra is required of the reader; techniques from algebra, number theory, and probability are introduced and developed as required. The book covers a variety of topics that are considered central to mathematical cryptography. Key topics include : classical cryptographic constructions, such as Diffie- Hellmann key exchange, discrete logarithm-based cryptosystems, the RSA cryptosystem, and digital signatures. — Fundamental mathematical tools for cryptography, including primality testing, factorization algorithms, probability theory, information theory, and collision algorithms. — An in-depth treatment of important recent cryptographic innovations, such as elliptic curves, elliptic curve and pairing-based cryptography, lattices, lattice-based cryptography, and the NTRU cryptosystem. This book is an ideal introduction for mathematics and computer science students to the mathematical foundations of modern cryptography. The book includes an extensive bibliography and index; supplementary materials are available online.